

MODEL

WW II COMBAT BIRDS page 26

AIRAGE

AIRPLANE

THE WORLD'S PREMIER R/C MODELING MAGAZINE

48120

NEWS

www.airage.com

Warbirds *Over* Delaware



GILES 202
Midwest's muscle machine

CONSTRUCTION



1/4-SCALE

Fokker D-VII

**HOW TO
DESIGN BIPLANES
REPAIR SCALE STITS**

**An Open Door to
Easy
Access**



February 1998

USA \$4.95

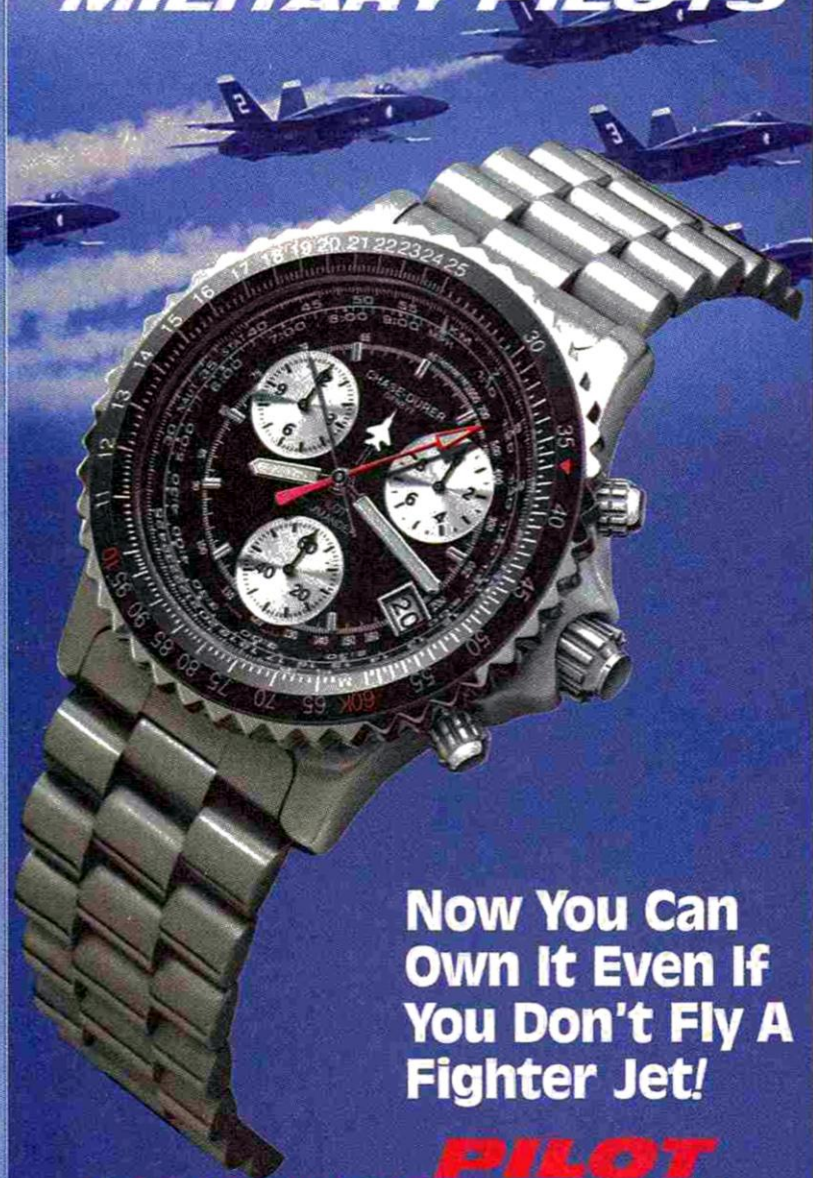
CANADA \$5.95



0 09128 48120 3

ENTER NOW! "TOTAL PACKAGE" SWEEPSTAKES

PRECISION SWISS CHRONOGRAPH DESIGNED FOR MILITARY PILOTS



**Now You Can
Own It Even If
You Don't Fly A
Fighter Jet!**

PILOT COMMANDER

Precision 27 Jewel SWISS ETA 251.262 Quartz Movement

7 Hands, 4 Dials, Twin Pushbuttons, Solid 316L Stainless Steel Case & Band, Sapphire Lens, Tritium Hands, 1/10th Second, Split Second, Partial and Lap Times, 6 Hour Timer, W/R to 330 ft. Revolving E6B Flight Computer Bezel, Date Window, Ltd. Five Year Warranty, Same Day Shipping.

\$700 Value - **ONLY \$349** +\$6 S&H

CREDIT CARD ORDERS CALL:
1-800-544-4365 ASK FOR OPERATOR 494

CHASE-DURER Watches Feature: 30 DAY MONEY BACK GUARANTEE
CHASE-DURER Ltd. • 270 No. Canon Dr. • Dept 1402-494 • Beverly Hills, CA 90210
Phone: 310.550.7280 / Fax: 310.550.0830 / www.WatchShop.com

MODEL AIRPLANE NEWS

EDITORIAL

Group Editor-in-Chief TOM ATWOOD
Editor-in-Chief LARRY MARSHALL
Editor GERRY YARRISH
Senior Editor CHRIS CHIANELLI
Associate Editors DEBRA D. SHARP,
ROGER POST JR.

PUBLISHING

Group Publisher LOUIS V. DeFRANCESCO JR.
Publisher YVONNE M. DeFRANCESCO
Associate Publisher SHARON WARNER

COPY

Copy Director LYNNE SEWELL
Copyeditor MOLLY Z. O'BYRNE

ART / DESIGN

Art Director ALAN J. PALERMO
Associate Art Directors
ANGELA A. CARPENTER, BETTY K. NERO
Assistant Art Directors
LESLIE COSTA, MATTHEW A. CHIAVELLI
Graphic Artist JOANNA WINN
Staff Photographer WALTER SIDAS

ADVERTISING

Director of Advertising SHARON WARNER
Assistant Manager JILL ELLEN AMALFITANO
Advertising Account Executives
TOSHA CRAWFORD, KATHY FARRELL,
MONA TASSONE
Advertising Traffic Administrator
SIRI A. WHEELER
Advertising Coordinator ANN T. WIEBER

MARKETING

Director of Marketing GARY DOLZALL
Marketing Manager DANIELLE RUGGIERO

CIRCULATION

Circulation Director NED BIXLER
Circulation Coordinator NANCY BENEDICT
Circulation Assistant JENNIFER ROTUNDA

OPERATIONS

Director of Operations DAVID BOWERS
Advertising Services Coordinator TOM HURLEY
Prepress Production Supervisor
CHRISTOPHER HOFFMASTER
Magazine Production Coordinator SHEILA STARK

CORPORATE

Chairman DR. LOUIS V. DeFRANCESCO
President and CEO MICHAEL F. DOYLE
Vice President G.E. DeFRANCESCO
Secretary L.V. DeFRANCESCO
Treasurer YVONNE M. DeFRANCESCO

CONTRIBUTORS

Dave Baron, Rick Bell, Joe Beshar, Mike Billinton,
Bernard Cawley, Roy L. Clough Jr., Hal deBolt, Don Edberg,
Guy Fawcett, Dave Garwood, Dave Gierke, Henry Haffke,
Greg Hahn, Tom Hunt, Michael Lachowski, Mike Lee,
Andy Lennon, George Leu, Mike McConville, Jerry Nelson,
Jim Newman, Vic Olivetti, Jim Onorato, Dan Parsons,
Dave Patrick, Dave Platt, Roger Post Sr., Randy Randolph,
Jef Raskin, Carl Risteen, Jim Ryan, Jim Sandquist,
Keith Shaw, Jim Simpson, Faye Stille, Craig Trachten,
Bob Underwood, Roy Vaillancourt, George Wilson, Nick Ziroll.



AirAGE

100 East Ridge, Ridgefield, CT 06877-4606
(203) 431-9000 • fax (203) 431-3000
INTERNET man@airage.com



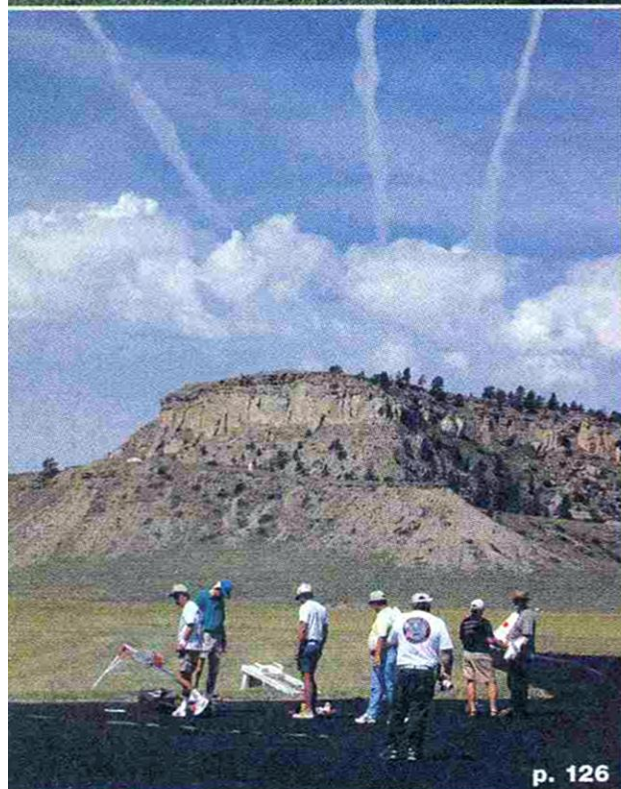
Member Audit
Bureau of Circulations

PRINTED IN THE USA

MODEL AIRPLANE NEWS



p. 54



p. 126



p. 32

ON THE COVER: the Midwest Products Giles 202 is a pleasure to fly (photo by Walter Sidas). Insets: lower left—this Fokker D-VII is a Gary Allen design and is featured in this issue; lower right—this “door” provides access to the radio gear in the Flitecraft Bonanza, reviewed in this issue. ON THIS PAGE: top—build this 88-inch-span WW I German warbird; middle—pilots at a scale combat meet in Montana take a break from dogfighting; bottom—reviewer Craig Trachten starts up his Flitecraft A-36 Bonanza.

February 1998 • Volume 126, Number 2

Features

26 Scale R/C Combat Western National Championships

1/12-Scale Dogfights Over Montana
by Doug Haacke

36 Warbirds Over Delaware

Military modeling at its best!
by Larry Marshall

46 How to: Repair Scale Stits Cloth

Invisible patches only you know are there
by Gerry Yarrish

62 How to: Biplane Design

Understanding the basics
by Andy Lennon

Reviews

32 A-36 Bonanza

Flitecraft

“Open the door” to excitement!
by Craig Trachten

42 Giles 202

Midwest Products Inc.

Experience the thrill of IMAC competition
by Jim Onorato

68 Thunder Tiger T-2000

Horizon Hobby Distributors

Quick wings for training
by Debra Sharp

Construction

54 Fokker D-VII

1/4-scale WW I German classic
by Gary Allen

Columns

11 Air Scoop

“I spy for those who fly”
by Chris Chianelli

22 Hints & Kinks

Illustrated tips from our readers
by Jim Newman

72 Air Power

Beat high-compression heat
by Chris Chianelli

76 Effective Programming

Things unique to computer radios
by Don Edberg

80 R/C Cybernews

Point-and-click drawing
by Jim Ryan

86 Scale Techniques

New and classic kits
by George Leu

90 Golden Age of R/C

The “Good” ole days
by Hal deBolt

130 Final Approach

50 years later
by Jim Ryan and Paul Conrad

Departments

8 Editorial

16 Airwaves

18 Pilot Projects

84 Planes Worth Modeling

104 Product News

108 Classifieds Ads

111 Pilots' Mart

118 Name That Plane

126 Index of Manufacturers

128 Index of Advertisers

EDITORIAL

by LARRY MARSHALL

SMALL PLANES ARE BACK!

Good things come in small packages!" An old expression—but this is what more and more modelers seem to be advocating these days, as small models are once again making a major comeback. For those of you who weren't there, the 1970s were a time when .049-powered planes were very popular. In those days, House of Balsa had a sizable line of .049-powered scale planes, many popular sport R/C planes had .049-size versions modeled after them, and Ken Willard seemed to produce a new small-plane design every month, while popularizing "fly in your front yard" model aviation. It was a time when small, simple models, powered by the ever-popular Cox engines, were being flown everywhere. All this activity was in spite of trying to do it with radio gear that was none too small by today's standards.

Well, they're back! It's hard to pin down a single reason for the renewed popularity of small airplanes. Maybe it's due to a shortage of building time—goodness knows that building small, simple birds takes less time than bigger ones—and it's fun to be able to build a plane in a few evenings. Maybe the difficulties of transporting today's giant-scale models causes folks—even those who like large planes—to take up smaller planes to increase their stick time by using the vacant lot near their home as a flying site. Maybe it's the low cost of small models, the reliability and ease of use of Norvel's new engines, or maybe it's just wanting to do something different. But whatever the reasons, flying fields are starting to see more and more tiny birds.

The popularity of Speed 400-powered electric models was never more evident

than at this year's KRC event. The sky was full of tiny pylon racers, scale planes, sport planes and sailplanes, all powered by these \$10- to \$12-motors. A walk along vendors' row underscored their popularity, as virtually everyone selling kits had at least one Speed 400 plane for sale, and for many, this has become their bread and butter. The smiles of the pilots flying them should provide us with some insight into why these small models are so popular.

The guys at Norvel have big smiles on their faces, too, because their products are selling quite well; so well, in fact, that House of Balsa is rapidly rereleasing its line of scale planes to give homes to

time. What other form of racing is there where the cost of aircraft and engine is \$75? The best part is that each time we fly these planes, we seem to "infect" a few more people, who run to the hobby shop so they can get into the act, too.

AMA 704 combat is growing by leaps and bounds. I guess you would call this "combat with style," as the guys competing build gorgeous sport-scale 1/12-scale warbirds and chase one another around the sky. Greg Rose and others have just established an official AMA combat special interest group (SIG). You can get more information about the SIG from the ASDA (American Scale Dogfighters Association) website at <http://imt.net/~ims/Combat/combatt.htm>. If you like warbird models, you've just got to check

out this site to see what's possible in the world of scale modeling, without spending a lot of money.

So, if you haven't tried a small model lately, maybe now's the time. But beware! From my experience and that of several of my buddies, small models are like peanuts—it's really hard to have just one!

AMA 704 NATIONALS & DELAWARE WARBIRDS

Just to give you a taste of what I've been talking about, Doug Haacke tells us of the fun they had at the AMA 704 Nationals, held this year in Wyoming.

Where else can you find model Hellcats chasing Zeros in true combat?

Lest you think everyone has given up their big birds, we're also taking you to one of the premier giant-scale warbird meets in the country. Warbird meets are also a growing phenomenon, especially up and down the East Coast. The Delaware meet is one of the largest because of its location. The plane of choice here is a big old warbird, with "warbird" defined as anything military. The sky is shared by Sopwith Pups, Corsairs and the occasional "between-the-wars" plane. While the Zenoahs and Quadras roar, a whole bunch of folks have fun at this meet—and that's what it's all about.



Yes, I've been bitten by the small plane bug, too. This is my Ace Texan, powered by a Norvel .061.

the Norvel powerplants. Robart have just rereleased their micro-retracts to provide tiny scale models with feet. Norvel themselves are gearing up to sell 1/2A planes, and Ace is expanding their "Simple Series" of small, easy-to-build models. Gus Morphis continues to provide those smitten with small-model building with a steady release of new, small warbird plans. Cox is also in the process of retooling to improve their line of engines.

Locally, we're gearing up to pylon-race Ace Texans using Norvel .061 engines. These quick-building planes fly like banshees with the Norvel engine, and it's just plain "cool" when we've got several of them in the air at the same



by CHRIS CHIANELLI

AirSCOOP

New products or people behind the scenes; my sources have been put on alert to get the scoop! In this column, you'll find new things that will, at times, cause consternation, and telepathic insults will probably be launched in my general direction! But who cares? It's you, the reader, who matters most! I spy for those who fly!



X250

SR's new X250 is a laser-cut balsa kit utilizing the same carbon-fiber main spar and leading-edge construction as the X440 sailplane. It has a wingspan of 36 inches, a wing area of 255 square inches and total weight of 20 ounces, including radio gear and power system. These specs factor out to a wing loading of 11 ounces per square foot and a stall speed of 12mph! The X250 can be powered by geared motors from the inexpensive speed 400 6V type right through to the high-tech Astro 020 brushless motor. With the Astro motor, climb rates of over 1,200 feet per minute and motor runs of over 10 minutes are possible using SR's 500 Max Series cells. The X250 is a gentle flyer on lower power combinations and rudder and elevator control. Add ailerons and that hot Astro 020 brushless motor, and the X250 is transformed into an all-out aerobatic machine. For more information, contact SR Batteries (516) 286-0079 or drop them a note: Box 287, Bellport, NY 11713.

1/4-SCALE D-VIII

This 82.7-inch-wingspan Fokker D-VIII (E-V) from Glenn Torrance Models will be released this summer. Very few details are available yet, but I'm sure this kit will be faith-



ful to the high quality Glenn Torrance is known for. I'm told Glenn will be doing a very colorful E-V version for Top Gun '98. This 12- to 14-pound model was designed for 1.20 to 1.60 4-stroke or 1.08 2-stroke engines. For more information, contact Glenn Torrance Models, 1258 Dogwood Rd., Snellville, GA 30078; (919) 846-4816; fax (919) 472-2940.



These handy clip-on pocket tools are not just a clever idea; according to distributor Davis Model Products, they also happen to be quality, American-made tools. All three sets—screwdrivers, drills and files—have hollow handles with removable caps for self-contained storage. Unlike the mini tools so often found in the bargain bin, these tools are made of hardened and tempered steel finished off in black oxide and clear anodized aluminum. Also pictured is a file-cleaning brush, which is available separately. For more information, contact Davis Model Products, 132 Pepe's Farm Rd., Milford, CT 06460.

POCKET WORKSHOP

This is the new ARF electric-ducted-fan Lockheed T-33 from Kyosho. The fuselage features smooth styrene-foam construction, and the 46-inch

foam wing is covered with a durable (OHS) plastic coating.

Powered by Kyosho's newly designed 8.4V ducted-fan unit with specialized AP29L motor (which produces 400 grams of thrust), the 37-ounce T-33 can reportedly be hand-launched without catapult assistance. According to Kyosho, the T-33, with its Clark-Y airfoil, has stable flight characteristics and is highly visible in flight because it's brightly finished in the Thunderbirds' show-team colors. Rumor has it that the T-Bird is the first in a series. I certainly hope so. For more information, contact Great Planes

Model Distributors, 2904 Research Rd., Champaign, IL 61826; (217) 398-6300; fax (217) 398-0008.

Silence Roars like Thunder

Spit from Down Under



Here's another fine scale design by Brian Taylor; this time, it's an exact scale 83-inch-wingspan Spitfire Mk VIII done up here in Australian markings. Bob Holman, distributor of Taylor's plans here in the U.S., tells me, "Brian was set to release the plans and accessories last year, but when the prototype was destroyed due to radio failure, the release was delayed till another model could be built and test-flown." It would appear Brian that doesn't like to release anything until proper testing has been completed and he feels everything is just right. By the time you read this, plans and accessories

should be set to go, and Bob's new laser-cutting equipment should be cutting parts for short kits. For more information, contact Bob Holman Plans, P.O. Box 741, San Bernardino, CA 92402; (909) 885-3959; fax (909) 889-9307.

Magnum Rear Needle Engines

Magnum's new multi-position, rear needle-valve system will debut on XL-40A and XL-46A engines. With this system, the needle-valve assembly mount is not part of the engine's backplate. This remote mount can be positioned to accommodate upright, side or inverted engine-mounting positions. The needle-valve mount is made of the same aluminum alloy as the engine's crankcase. This should supply solid, vibration-resistant mounting. For more information, contact Global Hobby Dist., 18480 Bandilier Cir., Fountain Valley, CA 92728-8610; (714) 964-0827; fax (714) 962-6452.





Golden Age Electric

When most of us hear the name "Hirobo," we think helicopters. In reality, however, for some time now, the Hirobo line has consisted of more than just helis. Pictured here is an ARF

electric of a Golden Age icon, the de Havilland Comet. Powered by two 380-size motors, the Comet was designed for intermediate to advanced flyers. The wing is made of molded Styrofoam while the fuselage is FRP (fiber-reinforced plastic). Specs: wingspan—45.3 inches; length—29.5 inches; weight—28.5 ounces; battery-flight-pack requirements—7.2V to 8.4V 600mAh. For more information, contact Altech, 80 Newfield Ave., Edison, NJ 08837-3817; 908 (225) 2100; fax (908) 225-0091.



Ever hear of VRTF? It's an acronym that may well become commonplace in our hobby in the not too distant future. It stands for virtually ready to fly and the VRTF concept debuts with Hangar 9's new Easy2 Trainer. According to the "We get people flying" Hangar 9

Airborne in Two Hours

guys, the Easy2 can be ready for the flightline in 2 hours. If that doesn't please the instant-gratification bunch, I really don't know what will. All the hard work has been done for you. Only final assembly (most of which appears to be accomplished with an *included* screwdriver!) and finishing touches are left to you. Here are a few examples of the level of prefabrication this model has been brought to. The wing panels are covered and hinged, the tail group can be bolted on to the fuselage, and the servos drop into the ingenious Shock-Loc™ system that also helps insulate them from vibration.

Most of what you'll need—everything except the radio, engine, propeller, fuel and starting gear—is included in the kit. You won't be working with any glue, paint, or covering because the Easy2 doesn't need any. The Easy2 also comes with the "Ticket To Fly" video—an R/C educational video. While this video shows you how to assemble and set up your new trainer, its guidance doesn't stop at the workshop. The instruction continues along with you to the flightline and demonstrates how to control your model and what to expect as you progress.

Have things been made too easy? I don't think so. The Easy2 just makes the journey to R/C enjoyment that much shorter. For more information, contact Horizon Hobby Distributors Inc., 4105 Fieldstone Rd., Champaign, IL 61821 (217) 355-9511.

Ergo 60 Sport

Get more for less!



Touted by three-time world champion Curtis Youngblood as, "The best buy in a .60-size heli," the JR Ergo 60 Sport was specifically designed for the American helicopter market. Identical to the original \$1,000 Ergo 60, the new Sport version not only lists for \$499.99, but also has *more* ball bearings than the original machine! OK; let me get this straight: you get more helicopter for less money Am I missing something here? Anyway, according to Horizon Hobby Distributors, the Ergo 60 Sport is a precision model that will perform any aerobatic maneuver you can dream up. Each kit includes a copy of the Ergo 60 Sport video hosted by Curtis Youngblood. This professionally produced, 17-minute video includes info on features and benefits of the 60 Sport, tips on moving up to the bigger, 60-size machine, plus plenty of flying action featuring demonstrations of the smooth aerobatics the Ergo 60 Sport is capable of. For more information, contact Horizon Hobby Distributors, 4105 Fieldstone Rd., Champaign, IL 61821; (217) 355-9511.

WRITE TO US! We welcome your comments and suggestions. Letters should be addressed to "Airwaves," *Model Airplane News*, 100 East Ridge, Ridgefield, CT 06877-4606; email man@airage.com. Letters may be edited for clarity and brevity. We regret that, owing to the tremendous numbers of letters we receive, we can not respond to every one.



LIKES FOKKER TRIPLANES

In the October '97 issue's Buyers' Guide, there's a listing for a Fokker Dr.I but no address or phone number is given. I would appreciate it if you would send me the address/phone number/website. Thanks a bunch. It would be really cool to see you guys do an article on the Fokker Dr.I, especially since I plan to build one. Love your magazine; it's worth every penny.

JERRY, email

The popularity of the Fokker Dr.I seems to have come as much from Snoopy as its longevity and success as a frontline fighter. Technology advancement as well as tactics development resulted in a short lifespan for the Fokker Triplane and aircraft such as the Fokker D.VII, featured in this issue, quickly took its place. Nevertheless, the Fokker Triplane remains an icon of WW I aviation and is the first plane people remember when they think about WW I fighter planes.

The Fokker Triplane kit you're referring to is produced by Flair Kits in England and is available in North America from Hobby Supply South. You can contact them at 1720 Mars Hill Rd., Suite 8365, Acworth, GA 30101; (770)-974-0843, email hss@hway.net. LM

SWAPPING FREQUENCIES

I read Don Edberg's article, "To PCM or not to PCM," in the October 1997 issue of *Model Airplane News*. I thought it was good and explained a lot. I prefer PPM myself, because I like to have control of my airplane after a glitch and not let the radio control it for me. Great article!

I have another question for you; you may be able to help me out. I have all Futaba radios and I was wondering if I can take a radio that is channel 20 and put in a new set of channel 30 or 40 crystals. Some people tell me it is not

possible and some tell me it is. Can you please set me straight on this issue? If you can't exchange the crystals, can you tell me why?

STEVE, email

The official answer is no; however, everyone does it. They say it's better not to go too far away if you do change, no more than 3 to 5 channels is typical advice. However, I say just try it out. The important thing is a range check. Be sure that after you swap crystals, you get the same range as before. Do not fly unless you do. Don Edberg



AGWAGON PLANS

I just finished reading the Top Gun coverage in the September '97 issue, and I was really impressed by Randy Hansen's Cessna A-188 Agwagon (he placed second in Expert). Where can I find plans for this model? Thanks for your help.

ROB CHEH, email

Rob, you're in luck! Randy sells his own plans for that model through his company, Northwest AG Aircraft. You can reach him at Rt. 4, Box 575-28, Astoria, OR 97103; (503) 458-6686. Please send us a photo for "Pilot Projects." when you're finished with the model. LM

VENTING GASOLINE TANKS

I've just gotten into a 1/3-scale laser project and plan to use a Brison 4.2ci engine with a Walbro carb. I know to connect the tank to the carb, but what's the best way to vent the fuel tank? I'm assuming you have to vent the tank. I've never seen any articles on the bigger gasoline engines. Love your magazine. Your articles inspired me to build the Lanier Laser. Keep up the good work!

JERRY CHAPMAN, email

Ah, big gas engines! (Grunt, grunt, happy male noises.) Setting up a gasoline engine and its fuel system is very easy

and straightforward. Yes, as with any other tank arrangement, you do need to vent the fuel tank for a gas engine. With a Brison 4.2ci engine I'd use at least a 20-ounce fuel tank and install it with the usual foam padding.

Make sure to use fuel tubing specifically designed for use with gasoline and with an i.d. of about 1/8 inch. Either a 2- or 3-line tank set up will work fine. In a Laser where you have a cowled engine, a 3-line setup will make fueling/defueling easier; just remember to cap the third line when not in use. Attaching a second fuel-pick-up clunk to the third line or running the internal brass tube to the bottom of the tank will facilitate easy defueling. Also, the distance from the tank to the carb for a gasoline engine is not as critical as it is with a glow engine. The Walbro carb has a built-in diaphragm pump and can draw fuel effortlessly if everything is working properly. Finally, don't use gasoline containing alcohol. Alcohol has been known to swell the rubber diaphragm within the carb. A good 87-octane gasoline with anywhere between a 30:1 to 40:1 gas/oil ratio mix will work just fine. Follow your engine manufacturer's recommendations and always use clean, filtered fuel. Good luck. GY

NEW COLUMN KUDOS

I'm glad to see your new column, Chris. I hope it comes of age well. I, too, have a problem with fuel providers not giving the oil content of their fuels. Could you give out the oil contents of the major fuel suppliers in your column? I use Omega. Any idea of the percentage of oil in it?

GLENN NOONAN, email

Glenn, if they aren't telling you guys what's in the fuel, what makes you think they're telling me?

Seriously, while I strongly feel the contents should be printed on the label simply because the consumer has the right to know, some fuel manufacturers will do the next best thing and tell you the lubrication type and content if you give them a call. Whether or not this is the case with Morgan Fuels (manufacturer of Omega), I can't say. Why not call them?—(800) 633-7556. And let me know how you make out. CC ♣

Pilot PROJECTS

A LOOK AT WHAT OUR READERS ARE DOING

SEND IN YOUR SNAPSHOTS

Model Airplane News is your magazine and, as always, we encourage reader participation. In "Pilot Projects," we feature pictures from you—our readers. Both color slides and color prints are acceptable. We receive so many photographs that we are unable to return them.

All photos used in this section will be eligible for a grand prize of \$500, to be awarded at the end of 1998. The winner will be chosen from all entries published, so get a photo or two, plus a brief description, and send them in!

*Send those pictures to:
Pilot Projects, Model Airplane News, 100 East Ridge,
Ridgefield, CT 06877-4606.*

GOLDEN AGE RACER

Jim Meikle of Peekskill, NY, scratch-built this Wedell Williams Gilmore Red Lion from Wendell Hostetler plans.

The 84-inch-span model is 67 inches long, weighs 21 pounds and is powered by a G-62 engine. Jim reminds us that the full-size plane was a famous racer back in 1932 to '36 and was clocked at 295.47mph.



ROYAL GULL

Rich Flinchbaugh of Newport, RI, scratch-built this Italian Piaggio P136L from enlarged Scientext plans. The amphibian has a 5-foot wingspan. Two AstroFlight 15 motors with a Jomar SM4 speed control and 16-1700mAh cells keep the 7 $\frac{3}{4}$ -pound model in the sky. Very nice, Rich!

SUPER SAUCER

John Carpenter of Whitefish, MT, scratch-built this wild-looking model from *Model Airplane News* plans. It weighs 8 pounds, has a 36-inch span and is 54 inches



long. The saucer is powered by a K&B .61 engine and is controlled by three channels: rudder, elevator and throttle. John says, "The model was great fun to build because of all the truss work construction" and adds that it has more than 700 parts. Whew!

BREWSTER BUFFALO

Ara Dedekian of Belmont, MA, sent this photo of his 55-inch-span Brewster Buffalo. The model was scratch-built from Don Williams plans by Ken Barr and was finished by Ara. The markings are those of Hans Wind, the highest-scoring Finnish ace of WW II. Ara writes that the model flies "rock steady" with an O.S. .61 in its nose.



STEALTH MODE OPTIONAL

Bill Chopp of Harvey, LA, scratch-built this Willit (as in "will it fly") and equipped it with an O.S. 1.08 engine. The 78-inch-span model has a fully operational canard and Rohm retracts. Bill writes that Willit is "a responsive yet docile flyer, having excellent takeoff and landing characteristics. It can knife-edge or go vertical forever."

SPEED 400 WARBIRDS

John Vago of Cincinnati, OH, was inspired by Jim Ryan's how-to article on friskets in the February '97 issue of *Model Airplane News* when he detailed his K&A Models Spitfire Mk 24 and Graupner BF-109. Both models have built-up, sheeted wings and have been airbrushed with Floquil lacquer military paints.



1/10-SCALE GIANT

This Fairchild C119 G "Flying Boxcar" was scratch-built by Nick Rivaldo of Long Beach, CA. Nick used a factory drawing and a plastic model kit to draw the plans for the 136-inch-span, 103-inch-long model and outfitted it with Robart retracts, flaps and wheel brakes. The model has a built-up balsa fuselage and foam wings and booms. A Quadra 52 keeps this 53-pound big bird in the air. Nick says that it can drop 10 miniature paratroopers and three toy jeeps with chutes and adds, "I have flown this plane several times and it flies like a dream."



SWICK-T

Sten Skalman of Hudiksvall, Sweden, sent this photo of his scratch-built, 82-inch-span Taylorcraft from *Model Airplane News* plans. He painted and modified the model to look like Margaret Riche's National Aerobatic Champion plane of 1966. The 11-pound plane sports Sig Koverall covering and a fiberglass cowl. A Quadra 35 spinning an 18x8 prop keeps the model in the air.

SABRE JET

Tom Perry of Schertz, TX, built this Bob Violett Models F-86 and outfitted it with flaps, wheel brakes and in-flight mixture control, and he converted the retracts and doors to an air system. Tom modeled the jet after one at the 1980 Reno Air Races and used Bob Banka Scale Model Research for documentation. A BVM .81 engine and Viojet fan unit provide power; Tom writes that it's a "rock solid flyer."



PITTS S-2B

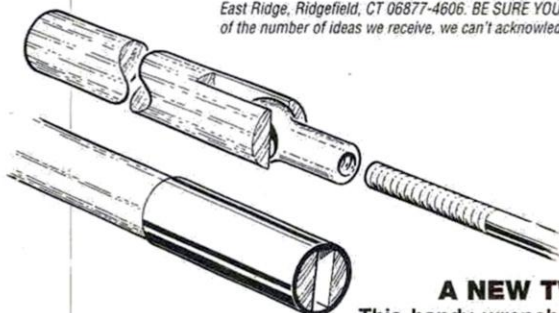
This photo of a Bob Dively Models 1/3-scale Pitts comes to us from David Skillings of South Freeport, ME. David's friend Curly Blas of Lewiston, ME, spent more than two years building the model, which features metal sheeting and screws in the forward sections, rib stitching and flying wires. It's covered with Koverall and painted with auto acrylic enamel and clearcoat, and a Q-75 engine with a B&D smoke system provides the horsepower. David says that the 35-pound Pitts flies great.



Hints & KINKS

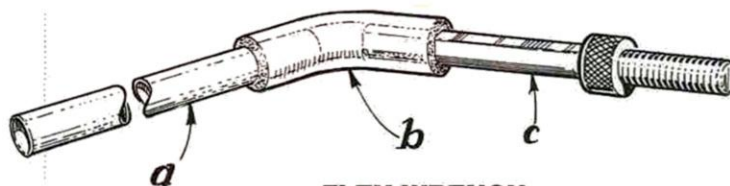
by JIM NEWMAN

Model Airplane News will give a free one-year subscription (or one-year renewal, if you already subscribe) for each idea used in "Hints & Kinks." Send a rough sketch to Jim Newman c/o Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606. BE SURE YOUR NAME AND ADDRESS ARE CLEARLY PRINTED ON EACH SKETCH, PHOTO AND NOTE YOU SUBMIT. Because of the number of ideas we receive, we can't acknowledge each one, nor can we return unused material.



A NEW TWIST

This handy wrench made from a slotted dowel and a heat-shrink sleeve makes threading ball links onto a pushrod very easy. Don used $\frac{5}{16}$ -inch (8mm) dowel for his.
Don Shoefelt, Laramie, WY



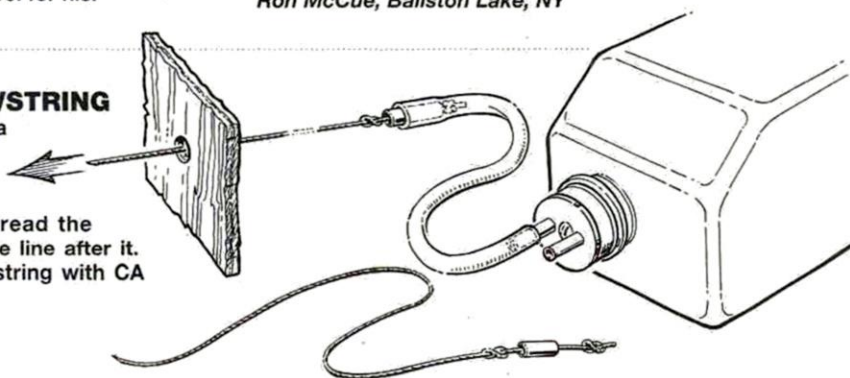
FLEX WRENCH

When you don't have a straight shot to the engine-mount screws, make this flexible starter wrench from a drinking straw (a), a rubber fuel line (b) and a sawed-off Allen key (c). The device is self-aligning and allows the screw threads to self-start in the T-nut.
Ron McCue, Ballston Lake, NY

DRAWSTRING

Make this fuel-line puller by threading a $\frac{3}{4}$ -inch (20mm) length of brass tube onto a piece of cord and retaining it with a couple of knots. Plug the fuel line onto the brass tube, thread the string through the firewall then pull the line after it. Stiffening the first few inches of the string with CA helps.

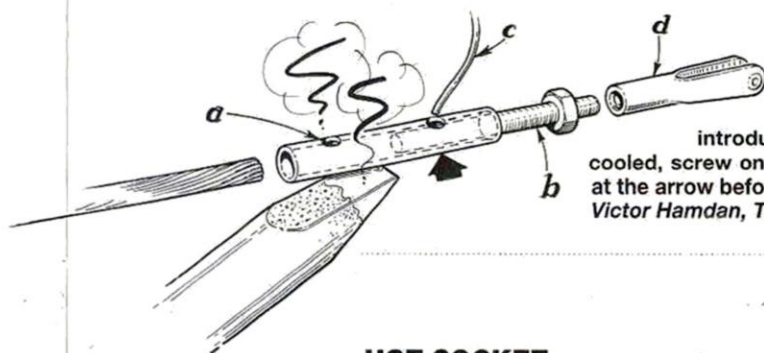
Mike Stidham, Middletown, OH



PUSH/PULL CABLE END

Here's how you can attach a clevis, etc., to a flexible cable: Cut about 1 inch (25mm) of brass tube, drill two $\frac{1}{16}$ -inch (1.5mm) holes (a), insert a short threaded rod (b), then introduce flux and solder (c) into the holes. When the solder has cooled, screw on a clevis or ball joint (d). Some people like to crimp the tube at the arrow before soldering.

Victor Hamdan, Tartagal, Argentina



HOT SOCKET

If your socket wrench keeps falling off the Allen key in confined spaces, apply a couple of spots of hot glue to keep it in place.

Larry Renger, Cerritos, CA

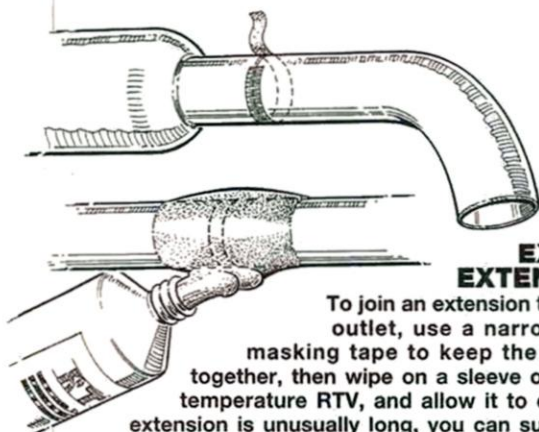


BIG SQUIRT

The little CA activator pump spray often requires several pushes to get it going. Trash it and get a refillable sprayer that can be pressurized with an inflator pump. It costs about \$11 in the \$2 catalog offered by Harbor Freight Tools, P.O. Box 6010, Camarillo, CA 93011.

H.C. Thorman, Blue Ridge, TX

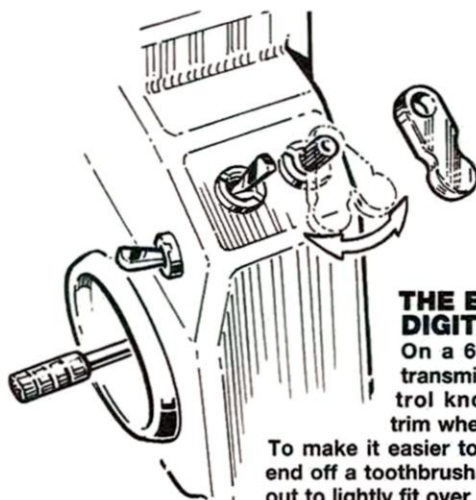




EXHAUST EXTENDER

To join an extension to a muffler outlet, use a narrow strip of masking tape to keep the two parts together, then wipe on a sleeve of red high-temperature RTV, and allow it to cure. If the extension is unusually long, you can support it by using tie wraps to hold it onto a bracket.

Ted Stockert, Bismark, ND

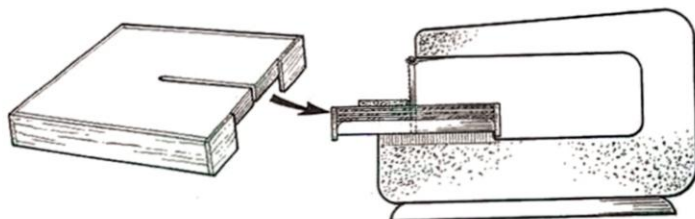


THE EXTENDED DIGIT

On a 6-channel Futaba transmitter, the flap control knob is useful as a trim when in elevon mode.

To make it easier to operate, saw the end off a toothbrush handle and drill it out to lightly fit over the knob. Operate it by extending your forefinger.

Paul Schroppe, Harrisburg, PA



BLADE LIFE EXTENDER

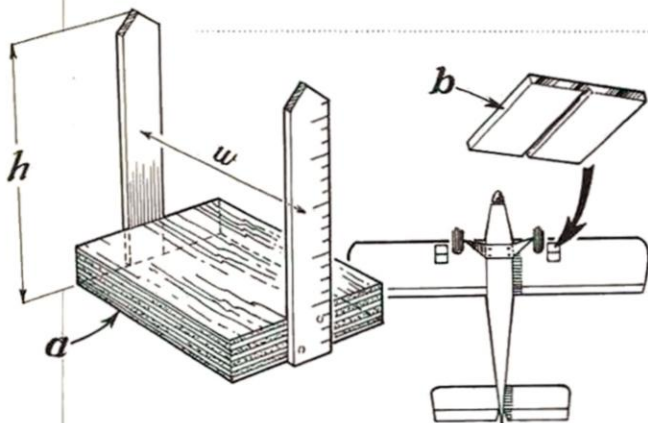
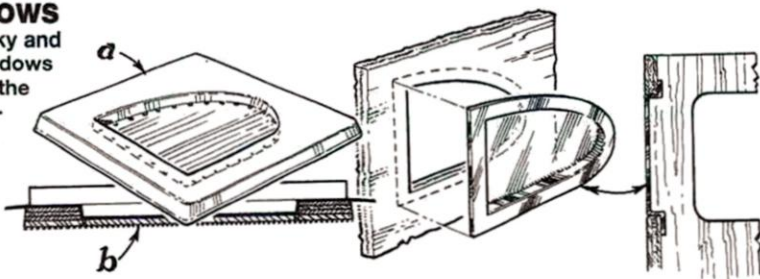
Only the 1/2 inch (13mm) of your jigsaw blade immediately above the saw table is worn down. To give new life to the worn blade, raise the parts to be cut with this 1/2-inch-thick false table made of plywood.

Ken Spokes, New Milton, Hants., Great Britain

RECESSED WINDOWS

Attaching side windows to a model can be tricky and messy. It's easier if you vacuum-form the windows so they can be pushed through and glued to the inside of the fuselage after finishing and covering. (A) shows a simple plywood mold with .040-inch (1mm) suction holes around the recess. It sits on a piece of aluminum screen wire (b) so that it will be drawn from below.

Be certain to make left and right windows!
Anthony DeMaio, Elmira, OR



IN BALANCE

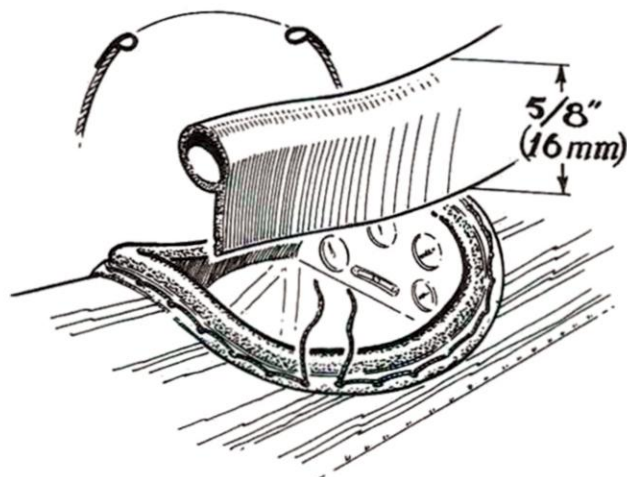
Make this simple stand for checking a model's balance point by cutting a yardstick as shown, hardening the points with CA, then gluing them to the sides of a thick ply board (a). Do not use pine, which can warp and cause the stand to rock. The dimensions "H" and "W" should clear the tallest and widest landing gear of your models. Make grooved pads (b) from 1/8-inch (3mm) plastic and tape them under the wing on the CG line so the pointed ends of the sticks won't puncture the wings.

John Paxton, Wayne, NB

BIG COAMING

Cockpit coaming for large scale models is as close as your hardware store. Usually used as draft protection around doors, this soft vinyl molding can be glued in place with PFM or Goo or laced on as in many full-size aircraft.

Don Manvell, Rome, PA



SCALE R/C COMBAT WESTERN NATIONAL CHAMPIONSHIPS

1/12-scale Dogfights Over Montana

*This is why
they call it
"Big Sky"
country. The
lads wait for
the next sor-
ties to begin.*



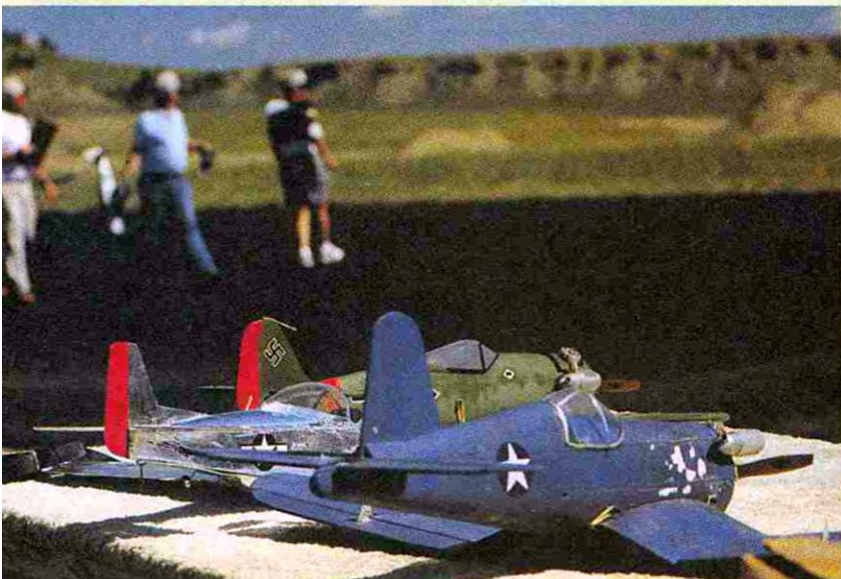
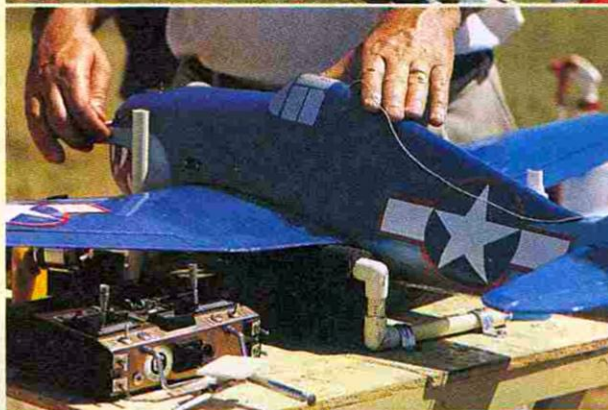
by DOUG HAACKE

WE LOVE COMBAT in Montana. In fact, we love it so much that we hosted the first Scale R/C Combat Western National Championships just to have an excuse to fly combat for two days straight!

When the scale R/C combat bug bit us about three years ago, it bit hard. After two years of flying sorties against one another, we began to thirst for new blood. We started investigating where combat was happening and who was involved. I started a combat page on the Internet (<http://imt.net/~ims/combat.htm>) and began making contacts. Before long, we realized that we weren't alone in our love of dogfighting; in fact, there were hundreds of fighter pilots all around the country who were itching to fight as badly as we were. It was then that club member Eric Hawkinson thought of hosting the Scale R/C Combat Western National Championships.

We figured, if you put a streamer on it, they will come ... and come they did. With entries restricted to 40, a nearly full field of the country's best fighter pilots and 150 of their favorite models traveled from 10 states to do battle in Billings. They brought with them a wide range of fighters, too. Combat

Clockwise from top: Doug Haacke's Bf 109E chases Dick Smith's Zero just seconds before they midair. The Zero's tail section is removed and crashes, but the 109 keeps flying for the kill and for extra points! • Pat Kenney's House of Balsa P-47 just as it comes off the catapult. Pat built his own catapult, which works extremely well. • Mark Metge prepares his scratch-built all-fiberglass Hellcat for the next round. Mark's Hellcats were extremely light for such large airplanes and flew very well. • Pat Kenney of Billings, MT, prepares to launch his P-47 just moments before the starter's horn is sounded. • War-weary fighters rest on Walt McIntosh's bench after a hard day of fighting.



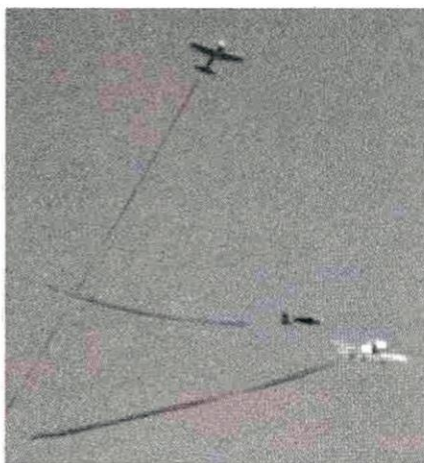
SCALE R/C COMBAT



rules dictate that model aircraft be replicas of actual warbirds that were in combat service between 1935 and 1955. Mustangs, Zeros, Bf109s, Hellcats, MiGs, Kawasakis, Corsairs, AT-6s, Spitfires, L-4 Grasshoppers, Fw 190s, Sea Furys, Arados, P-47s and P-40s were all represented.

THE GROUND (AND AIR) RULES

If you're not familiar with combat, the rules are pretty simple: tie a 30-foot streamer onto the tail of your approximately 1/12-scale combat plane, launch and, for seven minutes, try to cut your opponents' streamers while attempting to avoid having



Mike Fredricks's Zero, Doug Haacke's Bf 109 and Eric Hawkinson's P-40 mix it up. The skies were crowded on both days, so fans got to see nonstop action!

your streamer cut in the process. Points are scored for continuous flight and the number of cuts made. Simply put: in each round, it's you against five or six other blood-thirsty competitors. After 12 rounds of sorties, individual scores are added, and the pilot with the most points wins. It sounds easy, but cutting a streamer on a twisting, turning, speeding combat plane isn't as simple as it sounds. It takes lots of eye/hand coordination and tons of luck, but you'll have a ball in the process!

WINNING THE WAR

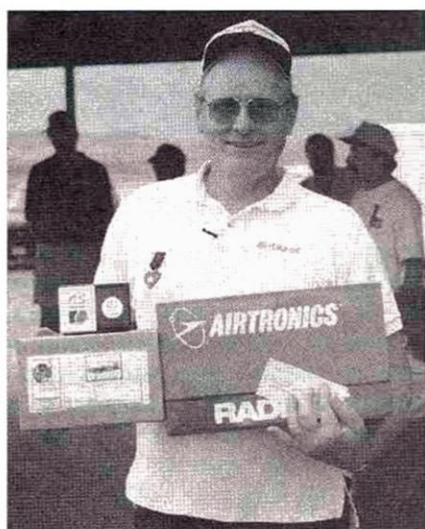
Like any model airplane competition, there are some engine/plane combinations that work better than others. Although most aircraft at the Championships performed well because of the talent of the pilots, there were some with features more appealing than others.

Zigg's* Zero, a foam design, was very popular. Both the fuselage and the wing are foam, only the tail feathers are balsa. This kit, like all of Zigg's foam kits, comes together quickly and is quite durable. Better yet, the models aren't covered and can be painted with ordinary house paint! Zigg's Corsair was another popular entry; it's quick and maneuverable, like the Zero.

The House of Balsa .20-size Mustang is also a great flyer. While larger than many, it turns very sharply and is very, very stable in flight.

Many contestants who wanted the advantage of speed were flying Ziggs and Collins Scientific's* Fw 190A models. These are for more experienced pilots.

Many Gus Morfis* designs were also used. Some were scratch-built, while others were built from Air-Kill* short kits.



Champion Earl Seaholm of Billings, MT, holds a few of the prizes awarded for first place. Earl also took home \$1,000 cash.

The more popular ones included the Hawker Typhoon, Tempest and Sea Fury, Grumman Bearcat, Curtiss P-47 and the Supermarine Spitfire.

O.S.* engines, ranging from the .15 to the .25FX, were in abundance and performed well, even under gruelling conditions. The

SPONSORS

The Western National Championships was a great opportunity to get a close look at a wide variety of scale combat planes and equipment. Besides all the beautifully scratch-built fighters, several vendors brought and flew their products in competition.

- **Jeff Weiss of Air-Kill Products** brought nearly his entire fleet. Air-Kill specializes in laser-cut kits of 1/12-scale combat planes that are suitable for both sport and combat flying. His Grumman F8F Bearcat is a stunning kit, a great flyer, and just happens to be my personal favorite. Jeff also has many short kits designed around Gus Morfis's plans.

- **Kurt Ziegler of Zigg's Originals** was also there, along with his fleet of kits and planes. Kurt sells a line of very easy-to-build, easy-to-fly, all-foam scale kits. They are incredibly well designed and very reasonably priced, and they can be built in a matter of hours and painted with ordinary latex house paint.

- **Airtronics** donated five radios as prizes, including their superb Vanguard 8-channel computer radio. The lucky first-place winner took that home, and the second- through fifth-place winners all took home brand-new Airtronics Radiant radios.

- **Great Planes** added to the goodies with a popular O.S. .20 FP engine.



WINNERS

PLACE	PILOT	AIRCRAFT FLOWN
1	Earl Seaholm	Zigg's Corsair; scratch-built L-4 Grasshopper
2	Ron Horton	House of Balsa Mustangs
3	Eric Hawkinson	Scratch-built P-40; PMA P-63
4	Jim Fech	Zigg's Zeros
5	Mike Fredricks	Zigg's Zeros
6	Doug Haacke	House of Balsa Mustangs
7	Wayne Van Orden	House of Balsa AT-6s; Fw 190
8	Wally Zoon	Zigg's Zero
9	Jeff Weiss	Air-Kill planes
10	Mark McCool	Precision Aero Fw 190; scratch-built L-4 Grasshopper



The winners of the 1997 Scale R/C Western National Championships. Back (left to right): Mark McCool, Jeff Weiss, Wally Zoon, Wayne Van Orden, and Doug Haacke. Front (left to right): Mike Fredricks, Jim Fech, Eric Hawkinson, Ron Horton and Earl Seaholm.

"speed" engines included the RJL* Conquest .15, a very powerful, but heavy, engine. The MVVS* .21 was heavily represented by many of the seasoned veterans who felt the need for horsepower.

TRULY A SPECTATOR SPORT

Our club benefited immensely from all the action and excitement. We certainly lucked out and had perfect weather. On both days of the event, the field was packed with anxious spectators who happily cheered on their favorite pilot while chomping on pizza, guzzling soda and beefing up the club treasury. What became immediately apparent, however, was something not normally seen at your typical fly-in, race meet, pattern meet, or airshow: cheering.

Not just polite clapping—cheering. Then yelling. Then more cheering and screaming. Then some *serious* cheering. The crowd, almost on their own, had chosen sides and whipped themselves into a frenzy rooting for their favorite pilots. During one of the final rounds, underdog Earl Seaholm of Billings, Montana, desperately needing a cut to regain the lead, turned his tiny L-4 Grasshopper toward a squadron of much faster Fw 190s. With the starter counting down the last few seconds in the round, Earl made some spectacular moves and sliced an enemy's streamer for the win, to the deafening roar of the approving crowd. With flights only three minutes apart, there was always something to watch. And, as you might expect, there were plenty of

Top left: Van Caryl of Everett, WA, just moments before launching Mark Metge's scratch-built, all-fiberglass Hellcat. Top center: Wally Zoon's Zero makes a pass by the flightline during combat. Wally's Zigg's Originals all-foam Zero was one of the few planes that lasted the entire two days of fighting. Top right: Jeff Weiss, owner of Air-Kill Products in Sacramento, CA, made the long drive all the way to Montana. Here Jeff mounts his Sea Fury on his own catapult design. Jeff had the best hard hat at the event.

midairs, adding to the crowd's delight. Although midairs are never encouraged, they are a fact of combat and most pilots came prepared, some with fleets of more than a dozen aircraft!

The pilots gave it their best and put on an impressive display of flying and sportsmanship. Parting words were filled with promises to get together soon and "have at it" once again.



Dave Wagensomer of Harper Woods, MI, carpooled with five other pilots from the Midwest. Here, David prepares his gorgeous MIG-3 for the next round.

No matter what aspect of model aviation you enjoy, why not consider giving scale combat a try? You may just discover that you have a fighter pilot inside you. For more information, please contact me at 2104 Mariposa Ln., Billings, MT 59102; <http://imt.net/~ims/combat.htm>; email ims@imt.net. ✦



Flitecraft's A-36 Beech Bonanza and 152 Aerobat (background) were each built in about four hours.

Flitecraft A-36 Bonanza

FLITECRAFT* HAS two new ARFs dubbed "Open the Door" airplanes. Open your mind to their possibilities. They are ingeniously designed, well-constructed using high-quality materials and inexpensive. This review is based on the Flitecraft A-36 Beech Bonanza, but their 152 Aerobat is put together similarly. (I liked the Bonanza so much I decided to build the Aerobat, too!) Gary Leonard and Flitecraft have come up with two of the easiest-to-build, most fun, great-looking, full-function R/C aircraft ARFs I've ever seen. Whether you're a beginner or an expert, these inexpensive, well-built products will blow your mind!

by CRAIG TRACHTEN

LET'S GET STARTED

The instructions claim that first-time builders can have this aircraft flight ready in a day; experienced builders, 3 hours. If you are experienced and hyper, they claim you can build it in 1½ hours. It is my opinion that a first-time builder could have this kit built in ½ to ¾ of a day. The 152 Aerobat took me about 4½ hours to build with breaks for coffee and a smoke (or two!). Working nonstop, you could have either of these kits flight-ready in 3 or 4 hours.

• **Wing.** The wing is high-density foam that's sheeted with a fuelproof pressed



*"Open the door"
to excitement!*



board that has printed graphics. The spar is a composite material with the main gear channel and mounting hole molded in. Epoxy the spar into the wing half. When the epoxy is dry, apply epoxy to the other half of the spar and the foam-core face of the other wing half. I find that I get a better bond when I apply a thin coat of epoxy to each wing half instead of a healthy coat to one half. Slide the wing halves together, check for alignment and tape them together to dry. Wipe off any ooze with a paper towel or rag moistened with rubbing alcohol. When the epoxy has dried, remove the masking tape and apply the center finishing trim tape. Mark and notch the position of the leading-edge cap. Apply a small amount of epoxy in the notches and position the edge cap. Run a bead of CA gel under the edges of the cap and tape it until it has dried. The epoxy in the notches will add strength where the wing bolts pass through the wing and prevent them from pulling through the wing.

Next, install the aileron control horns. This is a really unique system. The ailerons are hollow, and the control wires are factory-shaped. The wires slide into

the aileron; then a hardwood block is inserted to hold them in place. Before you glue them into place, install the trailing-edge wing cap the same way you installed the leading-edge cap. Position the aileron horns, then glue it into place. The aileron servo is mounted to the wing with two composite posts. Drill the pilot holes in the mounts and secure the servo. Using the supplied template, mark and drill two holes in the wing. Epoxy the posts into the two holes and wait for them to dry. The supplied aileron pushrods are factory-sized and have the correct angles and Z-bends. Does it get any easier?

• **Landing gear.** The main gear consists of two factory-sized and bent wires, two wheels and four wheel collars. With your hobby knife, cut away the foam board covering the notch in the spar. Use the notch to guide your knife for the first cut. Then, open the slit the width of the notch. Insert each wire into its support hole, and push down until the wire is completely in the notch. Drill pilot holes for the four landing-gear straps and install the gear. Mount the wheels.

The nose-wheel wire passes through a

SPECIFICATIONS

Manufacturer: Flitecraft

Model name: A-36 Bonanza

Model type: semi-scale low wing

Length: 43.5 in.

Wingspan: 62 in.

Wing area: 620 sq. in.

Weight: 5 lb., 7 oz.

Wing loading: 20.23 oz./sq. ft.

Engine req'd: .40 to .46

Engine used: O.S. .40 LA

Props recommended: 9x8, 10x5, 10x6

Radio req'd: 4-channel

List price: \$99.95

Features: high-density foam wing with composite spar; rubberized, synthetic plastic fuselage with pre-printed graphics. Low parts count; prop and spinner included; fully trimmed; fuel tank and pushrods included and installed.

Comments: I have built and flown many ARFs over the last few years, and I've never encountered an ARF like Flitecraft's A-36 Bonanza (and 152 Aerobat). To my knowledge, there aren't any other aircraft out there that can be built as quickly and are as much fun to fly as these. Beginner or expert, give yourself a treat with one of these "Open the Door" models.

Hits

- Complete with a capital "C."
- Looks good.
- Easy to build.
- Great flyer.

Misses

- None.

• Takeoff and landing

I fly off a relatively short—approximately 300-foot—grass field. I needed all of that for takeoff using the O.S.

.40 LA and the 9x8 and 10x6 props. With the 10x5, I was able to rotate in about 200 feet. The aircraft climbed out with no problem. Minor trim adjustment of elevator and aileron was needed for straight and level flight. Landing on grass with tricycle gear poses a problem with any aircraft, and this one is no different. You must flare just before touchdown and let the aircraft settle on the mains. The friction of the grass will slow the aircraft and bring the nose wheel to the ground. For the record, I attempted a three-point landing. The result was as expected: the aircraft came to a sudden stop, tailed over and ended on its back. No damage incurred!

• Low-speed performance

The A-36 Bonanza has great low-speed performance. Even though this is a low-

FLIGHT PERFORMANCE

its left wing and the nose will drop. Add some throttle and add a little up-elevator, and the aircraft will fly off straight and level. The only time I experienced any “bad” tendencies was when I was trying to find out how slowly I could fly the aircraft. I was on base turning to final. The aircraft was at landing speed when I started the turn, and the aircraft dropped fast. Adding throttle and up-elevator saved the Bonanza. The moral of this lesson: don’t fly at idle until you’re on final.

• High-speed performance

The high-speed performance of this aircraft was predictable and stable. The response to stick input was excellent. It didn’t show any bad flying tendencies. It handles more like a \$400 sport kit than a \$99.99 ARF. If

wing aircraft, it acts and reacts like a top-wing trainer. If you can get the Bonanza to stall, it will dip

speed is your thing, I suggest—and this has been done by some of the guys at our field!—that you mount a .46 instead of a .40 on your aircraft.

• Aerobatics

Inverted flight was as easy as normal flight. Rolls to the right were axial and crisp. Rolls to the left were a little sluggish but not terrible. Loops were easy and axial. Outside loops—no problem. The Bonanza held knife-edge for the length of our field. The next few stunts were jaw-droppers! At full throttle, straight and level, I tumbled the aircraft. Both sticks up and out. The response was crisp and stable. I released the sticks to neutral about $\frac{3}{4}$ through the tumble, and the aircraft continued on its way. Next I made it climb until it was a dot in the sky. Again I did the snap. This time, I didn’t release the sticks, and the aircraft spun toward terra firma. I counted 19 spins before I released the sticks and added a little up-elevator. In less than $\frac{1}{4}$ rotation, the Bonanza flew off in level stable flight.



The O.S. .40 LA engine provided ample power for the Bonanza.

Slide the horizontal stabilizer into position. Check to be sure it’s square and level. When you’re satisfied with the position, flow medium CA down the left and right and top and bottom seams. To install the vertical stabilizer, first test-fit it. I then mixed up a batch of 15-minute epoxy and poured it into the slot where the vertical stabilizer will be placed. After inserting the vertical stab, move it from side to side, making sure both sides of the stab contact the epoxy. I taped the assembly to hold it square until the epoxy cured. When the tape was removed, I flowed medium CA down the seams on both sides of the stab. When everything has dried, install the

control horns and attach the factory-installed pushrods.

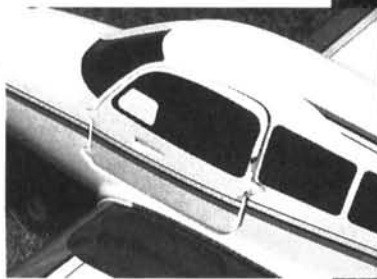
• **Engine.** Mounting the engine is as easy as 1, 2, 3. Slip your engine into the pre-installed engine mount. Mark and drill the mounting holes. Mount your engine and attach the factory-installed pushrod. Note: with some engines, as with the O.S.* .40 LA that I used, the supplied spinner can not be used. I installed a C.B. Tatone* 2-inch spinner that has a flat backplate. The supplied spinner’s backplate is recessed and didn’t provide the necessary clearance between the cowl and spinner.

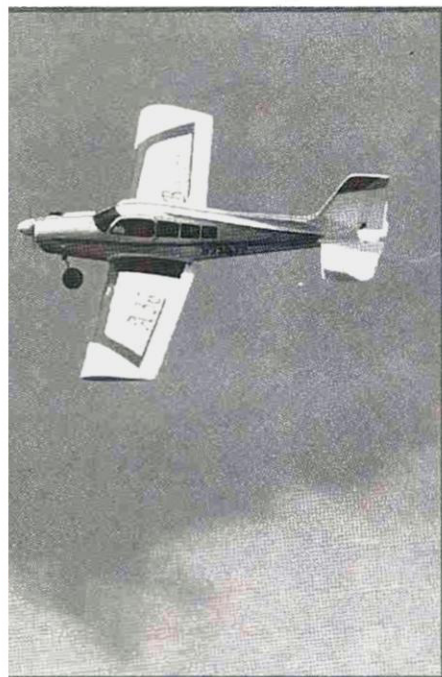
• **Fuselage.** The fuselage is made of rubberized, synthetic plastic, which is light

hole in the bottom of the fuselage, through the factory-installed control arm, and into the engine mount. When it’s in place, tighten the setscrew and install the nose wheel. Take note of how many times I state “factory-installed” or “factory-shaped”! I don’t like to be repetitious, but the fact is, most of this kit is factory-built.

• **Empennage (tail feathers).** The elevator and rudder have already been installed on the horizontal and vertical stabilizers.

This door opens to reveal the radio compartment.





and extremely resilient. The entire radio is installed in the molded-in compartment on the port (left) side of the fuselage. The only construction required on the fuselage is to drill and tap the wing-bolt holes and apply the wing seating tape.

• **Radio.** Any quality 4-channel radio will work with this aircraft. I used my Futaba® 8UAF. The throttle, rudder/nose gear and elevator servos are mounted in the side of the aircraft. Just "open the door" and you are there. The three servo openings are molded right into the side of the fuselage. There's also a compartment for the receiver and receiver battery. Just use the mounting screws supplied with your servos to mount them. I servo-taped the receiver and battery to the side of their compartment and placed a piece of foam rubber over them before I closed the door. Before you do that, though, fire up your radio and set the servos to neutral. Attach the control rods to the servo arms and install them as instructed. All control-rod ends are just placed in the rods. You'll have to adjust their length to fit.

CONCLUSION

I have built and flown many ARFs over the last few years, and I've never encountered an ARF like Flitecraft's A-36 Bonanza (and 152 Aerobat). To my knowledge, there aren't any other aircraft out there that can be built as quickly and are as much fun to fly as these. Beginner or expert, give yourself a treat with one of these "Open the Door" models.

*Addresses are listed alphabetically in the Index of Manufacturers on page 126.

Lite as a feather. Tough as nails.



The Lite Machines™ 100+ is the fun helicopter beginners can handle!

From the powerful NORVEL Vmax-6™ helicopter engine and durable semi-flexible rotor blades that fold upward in crashes, to the patented Arlton Gyro™ tail-rotor stabilizer, the light weight Lite Machines™ 100+ helicopter is filled with features designed for beginners. And with a rotor diameter of only 24 inches (61cm), the 100+ fits in a school yard and in the trunk of your car.

The 100+ also fits a beginners budget. At \$199 including an Arlton Gyro, the Lite Machines 100+ is about the cost of a good crash in a larger helicopter. Already have a radio? Try a Servo Combo with engine and micro-servos for only \$389. Starting from scratch? A Super Starter Combo complete with radio, engine, and accessories is only \$499.

For a free color brochure, call 765-463-0959.



The Lite Machines 100+ is shown above with optional colorful accessories. The many unique features of the Lite Machines 100+ are patented or patent pending in the United States and other countries.

1291 Cumberland Avenue, West Lafayette, IN 47906
765-463-0959 • FAX: 765-463-7004



NORVEL



THE BEST TRAINER EVER...



Wing Span: 61 in.
Wing Area: 732 sq. in.
Length: 43 in.
Req. no. of Channels: 4
Req. Engine: .40 - .46

Made of foam with a core of strong wood, covered with our exclusive glassine-polyester film and formed plastic, beautifully decorated. Aluminium landing gear. All crafted with pride and maximum quality.

INTRODUCTION
PRICE \$79.60
PLUS S&H U.S.

The "only one" that combines:

- ✓ **CRASH RESISTANCE**
Learn with Confidence, not with fragile balsa.
- ✓ **AERODYNAMIC BEAUTY**
No more boxy trainers or flying sticks.
- ✓ **SUPER SIMPLE ASSEMBLY**
Get it today, fly it Tomorrow.
- ✓ **EXCELLENT FLIGHT**
Noble, docile, yet performs main aerobatics.

TO ORDER:

Call: (956) 724 4594 or
Fax: (956) 724 6653
Mr. Pablo Rivera, 105 East Hillside, Laredo TX 78041
E-mail: privera@border.net

SATISFACTION GUARANTEED!

Air Conquest
Celebration
A. Reyes 2205
Monterrey, N.L.
64280 Mexico
fax: (011) 528 370 8114



Questions: E-mail: Terabyte@airquest.net.mx



A Fokker Dr.I on patrol over the trenches of Lum's Pond.



Warbirds *Over* Delaware

by LARRY MARSHALL

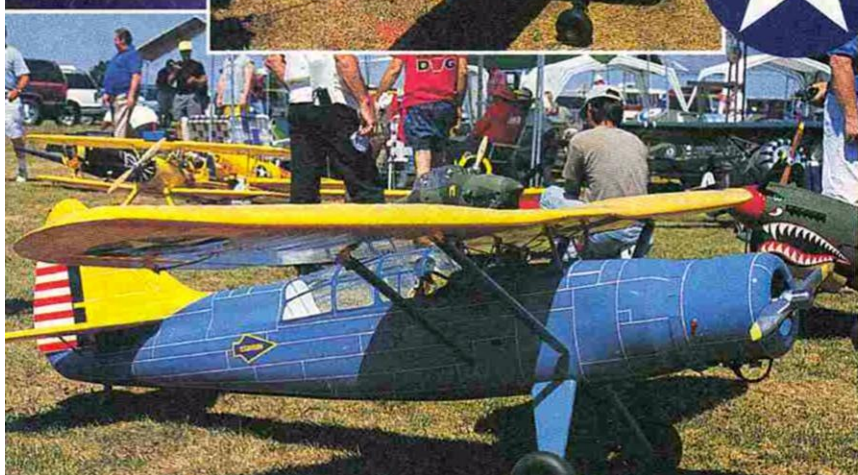
Military modeling at its best!



One of the most unique aircraft in attendance was Nick Cucarolla's L-15.



▼ Ray Suder brought his OV-46A to the fray.



Easily mistaken for a Texan, this Whirraway is one of its brethren.



Tim Haggerty did his best to defend Delaware against the more numerous German Fokker Dr.Is by putting in many sorties with his G-62-powered Morane Saulnier.

There were 16 Texans on the flightline, and this one was striking with its polished-aluminum finish.



WHEN I HEADED down the highway to the Warbirds over Delaware meet, I was quite excited. I'd not been to the meet before and, for that matter, I'd never been to Delaware. But this meet is known to be one of the best warbird meets, with a very large gathering of great planes and pilots who come from near and far to attend.

Robert Allen built this eye-popping Bristol Scout. Powered by a Quadra 35, it flew as good as it looks.



Of the 15 Corsairs in attendance, Barry Herthum's 100-inch wingspan "Hose Nose" was certainly the largest.

I'd gotten very explicit instructions from Gerry about how to get to the Lum's Pond site and so, though I'm geographically impaired, I had no doubt I would find it without problem. After all, Gerry had been to the event many times and so knew the way well. I followed his map and, sure enough, I found Delaware and crossed the bridge that links New Jersey to this fine state. According to Gerry, I was to exit "immediately after crossing the bridge," which I did. I then spent the next 45 minutes "enjoying" the countryside as I tried to find Lum's Pond. Eventually, I came to the realization that relying so completely on Gerry for directions might not have been such a great idea.



This young flight engineer is putting everything he has into getting this Corsair back to the maintenance area. You're never too young to start getting interested in model airplanes.



Warbirds

Several direction sessions with the local citizenry, a few miles, and the purchase of a map later found me on the road to the "real" exit for Lum's Pond, some 10 miles after the bridge. I guess people in Connecticut have a different definition of "immediately" from what I'm used to. But, eventually I arrived to find both Gerry and George Leu sitting under an awning, taking in the flights of some of the warbirds present.

The Lum's Pond flying site is actually a park, and it's very well maintained. Great facilities and good, close parking make it ideal for Joe Asher, the event's organizer, to conduct the event in a laid back, but very well-organized manner. No wonder it's so popular. One pleasant surprise is that there is no landing fee. Robart, Nick Ziroli, and JR are nice enough to sponsor the event, and raffle tickets are sold to raise enough money

pass duels that seem to take place at every one of them. These big warbirds are rock stable in flight, so the guys take advantage of that and chase each other around the patch, making low—and I mean very low—"strafing" passes over the field. These passes are so low that whether the grass has been cut or not makes a difference in how



Ed Hirschfeld brought along this 101-inch-wingspan Udet. Is it any wonder that so many of us love big biplanes?

to cover the costs. The cost to fly, however, is paid by simply passing your IMAA-legal warbird through the safety check.

Unlike some other warbird meets, this one has no time period rules. If it's a plane that flew in military colors, as far as Joe is concerned, it's a warbird, and this provides the event with a very interesting flavor. In addition to the Texans, Corsairs and P-40s of other warbird events, there are Bristol Bullets, Fokker Dr.Is and O-46 observation planes. I guess, if you were searching for a pun, you'd say, "The sky's the limit,"... but I wouldn't say that.

One thing about warbird meets that's really fun to watch are the low-



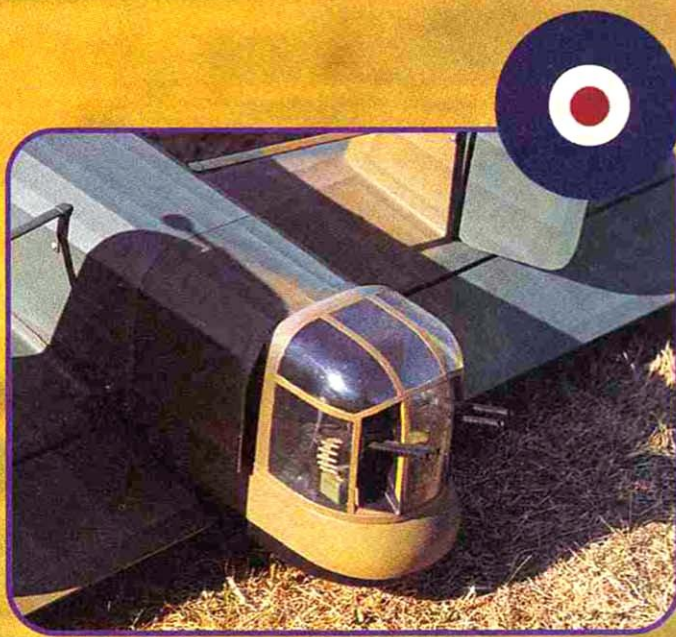
low they actually go. In fact, Nick Zirolì Jr. dropped his Zirolì P-40, powered by a 3W-120 in-line twin, so low that both prop and belly caused the earth to move, or at least a small piece of it. That didn't slow either him or the plane down much, though, as he was making another pass in a matter of a few seconds.



Hellicats were in abundance; this one done in early vintage markings.



John Peck brought his Armstrong Whitley up from Kentucky. The fabric effects on this great bird are actually the result of airbrushing.



Warbirds

Everywhere you looked there were beautiful warbirds—well over 200 of them. By my count, there were 16 AT-6/SNJ's present, 15 Corsairs scattered around the pit areas and nine Stearmans. WW I aircraft were also well represented with eight Fokker Dr.I's, five Eindeckers, three Fokker D-VII's, and a couple of D-VIII's. One WW I plane that stands out in my

memory was Robert Allen's Bristol Scout. It was built from *Model Airplane News* plans, but those plans only served as a starting point for Robert as he had detailed the plane, including scale cowl, scale struts and all the rigging wires. Done up in a color scheme from the Windsock Datafile on the Scouts, its natural linen

unique aircraft award has simply got to go to Nick Cucarollo, who brought a Cessna L-15. This pod and boom, twin-tailed observation plane, with its lanky, unorthodox undercarriage, has simply got to be seen to be believed. Ray Clapper flew it in scale-like fashion, and the plane certainly captured my imagination.

There are also vendors at Delaware Warbirds. The vendor area is great for the manufacturers because it's in the shade, which is a sure pilot magnet on a hot, sunny day, which we had this weekend. Roy Vaillancourt was there showing off his latest—a big FW-190. And Innovative Model Products was there with several of their warbirds as well as a handy supply of PFM.

Glenn Torrance was there, too. Glenn was showing off the prototype of his soon to be released 1/4-scale Fokker D-VIII/IV, which is sure to be a popular kit.

The kit cutters were there, too. All American Kit Cutters is now selling laser-cut kits for many of the popular giant warbird designs. Gary Madden of Madden Models was there as well. I don't know how Gary does it, but he produces the best Ziroli wood kits I've ever seen. I bought one of his

Hellcat kits last spring, and you can dry assemble the wing and much of the fuselage; the parts fit is that good.

When the dust had settled at the end of the weekend, there had been a few planes lost in battle, but the score was smiles all around. It's no wonder warbird meets are becoming so popular. ★



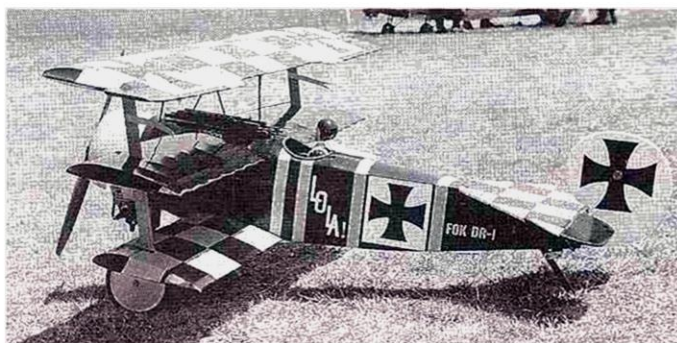
Left: this beautiful Boeing P-12 flew in from Pennsylvania for the meet. **Right:** Mark Frankel's T-34 Mentor is an incredible model, with details everywhere you look.



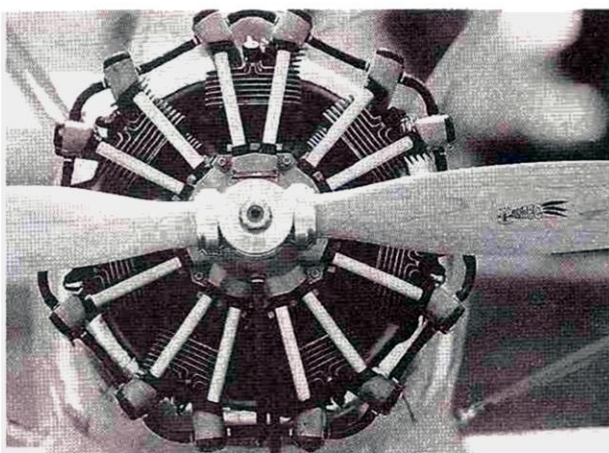
I've ever seen. I bought one of his Hellcat kits last spring, and you can dry assemble the wing and much of the fuselage; the parts fit is that good.



Rudy Forst's 144-inch wingspan DC-3 is powered by two Quadra 42s and sounded as good as it looked. Right: this 1/3-scale Fokker Dr.I was powered by a Quadra 35, more than ample power to fly it in a realistic fashion.



Left: even Hermann Goering put in an appearance with his Fokker D-VII. **Right:** it's not surprising that Bob Walker of Robart flies his enlarged Ziroli Stearman using one of the radials he manufactures. With one of the new adjustable pitch props from Moki, it doesn't get much more realistic than this.



*Experience the thrill
of IMAC competition*



Midwest Products Inc.

GILES 202

by JIM ONORATO

THE GILES G-202 KIT IS part of the Midwest* "Success Series," which includes several other IMAC and IMAA-legal aerobatic models such as the Citabria, Extra 300S, CAP 232 and the Super Stinker. These kits feature complete and fully illustrated step-by-step construction manuals and full-size plans that ensure success.

The Giles G-202 is a high-quality kit featuring jig-lock construction, micro-cut liteply and balsa parts and a complete hardware package. As I have found with all Midwest kits, the quality of the balsa is excellent. The 48-page instruction manual includes a description and/or illustration of all kit parts and contains 271 building steps, most of which are fully illustrated. I prefer manuals with illustrations rather than photographs because they show exactly what the designer intended in each step. The only thing I didn't like about the kit was that the plan was printed on both sides.



FUSELAGE CONSTRUCTION

I used Pacer's* Zap CA for most of the construction and 5- and 30-minute Z-Poxy on the high-stress areas such as the firewall and landing-gear mounting blocks. Construction began with the tail feathers, which were straightforward. The stab and fin are built up with 1/4-inch stripwood and are then sheeted with 1/16-inch balsa. The elevators and rudder are made with 3/8-inch stock. The die-cut parts are 3/32 inch thick, and several are laminated to match the thickness of the frameworks. The elevators have aerodynamic balance tabs that have to be mass-balanced with fourpenny finishing nails.

The G-202 fuselage is built using interlocking die-cut parts (mostly lite-ply) that self-align during construction. Because the parts interlock, it's important that you follow the construction sequence given in the instructions. The lower section of the fuselage is built upside-down over the top view on the plans and is then lifted to install the engine box and turtle deck. All the parts fit perfectly, and they interlock to give a strong, straight structure.

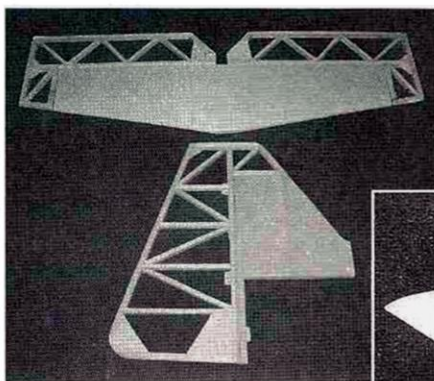
The landing gear is made of two pieces of pre-formed aluminum that are attached to the fuselage with four 8-32 bolts and blind nuts.

The engine box sides are made of two 3mm die-cut lite-ply parts laminated together. You have to keep the left and right sides oriented correctly, as they are pre-cut and provide the correct amount of right thrust. The firewall is made of three 3mm lite-ply parts that I laminated using 30-minute Z-Poxy. The thrust line on the firewall has been marked with the proper offset to correct for the necessary right thrust and keep the spinner in the center of the cowl. The firewall is glued to the engine box sides with 30-minute Z-Poxy and pinned with four 1/8-inch dowels on each side. This made for a very strong front end.

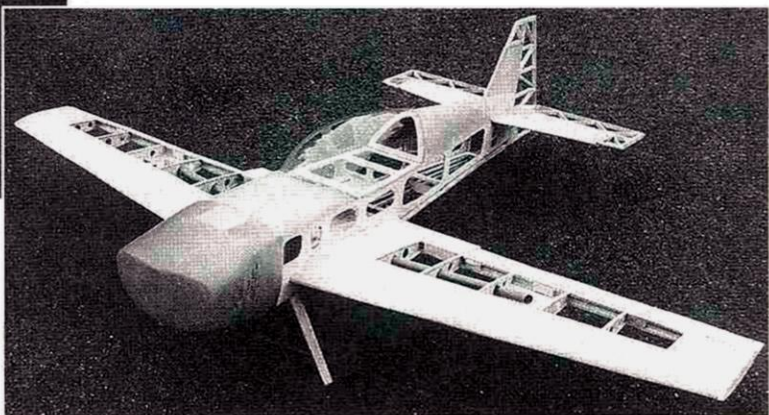
The turtle deck is constructed of 1/32-inch plywood formed over two lite-ply formers. The upper, forward portion of the fuselage is also made of 1/32-inch plywood and is

formed over three stringers. I sprayed the ply with ammonia and water to get it to bend easily without cracking.

The cowl and wheel pants are trimmed ABS plastic; this eliminates tedious trimming and fitting. They need only to be glued together with PVC cement and reinforced with fiberglass tape. The instructions recommend that you reinforce the seams and rear edge of the cowl with fiberglass tape to prevent them from cracking. The ABS parts in my kit were



Above: the stab and fin are built up with 1/4-inch stripwood and are then sheeted with 1/16-inch balsa. The elevators and rudder are made of laminated 3/8-inch stock. **Right:** all framed up, the Midwest Giles 202 looks more than sturdy enough to handle high-power aerobatics.



quite sturdy and would have been completely adequate as supplied; however, I was fortunate enough to have a set of Aeroglass* fiberglass wheel pants and cowl that I used instead. These were beautifully made and fit the G-202 perfectly.

WING CONSTRUCTION

The G-202's wing panels are built directly over the plan, using it to position the parts. The ribs and sheeting are 3/32-inch balsa, and the spars are 3/8-inch-square spruce. The wing ribs have jig tabs on the top side to ensure that the wing is built straight and twist-free. Each panel is first built upside-down and is then flipped over so the top side can be sheeted. Three wing-jig fixtures are used to keep the panel straight while the top side is completed. The notches in the ribs were die-cut so precisely that the stringers did not even have to be pinned prior to gluing.

The wing panels are joined upside-down on a flat building surface. The correct dihedral angle is achieved when the wing is joined, flat across the top, while the wing chord centerline is parallel to the work surface. A jig is provided to accomplish

SPECIFICATIONS

Name: Giles G-202

Manufacturer: Midwest Products Co.

Type: aerobatic 27 percent sport scale

Wingspan: 72 in.

Wing area: 960 sq. in.

Airfoil: symmetrical

Weight: 12 lb., 4 oz.

Wing loading: 29.4 oz./sq. ft.

Length: 64 1/2 in.

Radio req'd: 4-channel w/six servos

Engine range: 1.08 to 1.50 2-stroke or 1.20 to 1.82 4-stroke

Engine used: Saito FA-182T

Street price: \$209.99

Features: all wood jig-lock construction with conventional, built-up balsa tail feathers and wings. The wing has a symmetrical airfoil and unique swept leading-edge planform. Comes with rugged, prebent aluminum landing gear; trimmed ABS cowl and wheel pants; vacuum-formed canopy; computer-generated (3D CAD) parts and plans; complete hardware package; self-stick decals; 48-page, illustrated construction manual; and full-size rolled plan.

Comments: the Midwest Giles G-202 is a high-quality, easy-to-build kit that's light and flies great. It is a high-performance airplane that is capable of every maneuver in the book; its aerobatic performance should satisfy even the most demanding pilots.

Hits

- High-quality materials and die-cutting.
- Fully illustrated, step-by-step instruction manual with setup and flying tips.
- Excellent flight performance.

Misses

- Plans printed on both sides.

this. The dihedral angle of the G-202 is important, so be sure you don't change it. I used 30-minute Z-Poxy to join the panels. Incidentally, the opening for the dihedral brace in rib 8 should be cut out before the shear webs are glued to the spars.

RADIO AND ENGINE

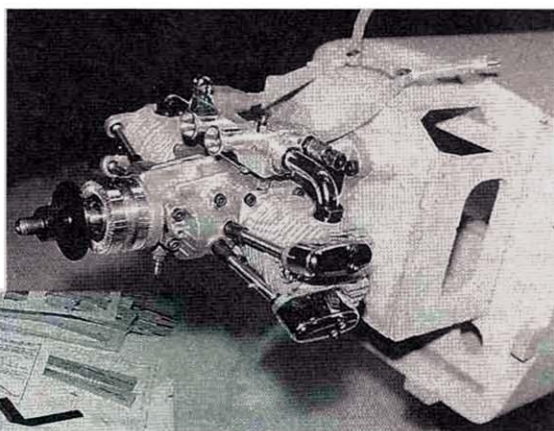
I used six DAD* Pro Plus servos in the G-202. Two 80 oz.-in. servos for the elevators and one 130 oz.-in. servo for the rudder were located in the rear of the fuselage under the stab. Two 80 oz.-in. servos were used for the ailerons and located in the wing panels just in front of the ailerons. The sixth servo was for throttle.

The G-202 was powered with a Saito* FA-182T twin 4-stroke engine with an 18x8 Top Flite* Power Point propeller. The 182 is the largest engine recommended for the G-202 and, I must say, it's an awesome-looking machine. The engine has two glow plugs in each cylinder and two carburetors. I used a McDaniel* onboard switch to light the two front glow plugs at low throttle. The engine was easily started by simply flipping the prop clockwise against compression.

FINISHING

I decided to base my finish on the trim scheme used on the full-scale Giles G-202, but I used Metallic Blue MonoKote* instead of Midnight Blue as the primary color and yellow MonoKote for the trim.

Right: the largest engine recommended for the G-202, the Saito FA-182T twin 4-stroke, is an awesome-looking machine. Below: the wing panels are built right over the plans, and the ribs have jig tabs to ensure that the wing is built straight and twist-free.



Midwest's optional, two-piece detailed instrument panel added a little pizzazz to the cockpit, as did a 1/4-scale Hangar 9* civilian pilot. The finishing touch was a beautiful 3 1/2-inch aluminum Tru-Turn* spinner.

CONCLUSION

The Midwest Giles G-202 is a high-quality, easy-to-build kit that's light and flies great. It is a high-performance airplane that is capable of every maneuver in the book; its aerobatic performance should satisfy even the most demanding pilots. This is one of the only planes I've built that came within the advertised weight range. With a wing loading of under 30 ounces per square foot, it's a joy to fly. If you love high-performance aerobatic airplanes, you'll enjoy building and flying Midwest's Giles G-202.

*Addresses are listed alphabetically in the Index of Manufacturers on page 126.

Great Planes* 1/8-inch red Kwik Stripe striping tape was used to offset the two colors. The instruction manual contained a covering outline of the prototype that was very helpful. I had to modify the design on the cowl because I couldn't find any spray paint to match the metallic blue MonoKote. The flatter portions of the cowl were covered with MonoKote and the front portion was painted with Top Flite yellow LustreKote. I used Top Flite Metallic Blue LustreKote on the wheel pants because they aren't next to any MonoKote, and the slight color mismatch was hardly noticeable.

FLIGHT PERFORMANCE

was made with the controls set at low rate.

• Takeoff and landing

The Giles G-202 handled very well on the ground. Tracking on takeoff was good, and only a slight amount of right rudder was required to keep it going straight. Flying speed was achieved quickly at 1/2 throttle, and a gentle pull on the elevator was all that was necessary to get the plane airborne. It climbed out nicely with the wings perfectly level. Landings were just as easy. The Giles G-202 was slowed way down for landing and flared just before touchdown for beautiful 3-point landings.



The control surfaces were set up with the throws recommended in the instruction manual and exponential on all surfaces. The initial flight

• Low-speed performance

The Giles G-202 demonstrates excellent slow-speed characteristics and has a very predictable and gentle stall. Control response was good at all speeds. It flew so smoothly, I got the impression I was flying a much larger airplane.

• High-speed performance

The Giles G-202 is a "go where you point it" airplane at high speeds. It tracks extremely well and is a smooth and stable flyer. Because of the size and effectiveness of the control surfaces, Midwest recommends the use of exponential to soften the feel around neutral. They also recommend that you not perform prolonged full-throttle dives, as control-surface flutter could result.

• Aerobatics

"The Midwest G-202 is a very honest, high-performance model that is capable of any maneuver imaginable." So states the instruction manual and, frankly, I believe it! Aerobatics are what this plane is all about. The recommended control throws are large and can cause some pretty violent aerobatics, so take it easy on your initial flights. The Giles G-202 flies as well inverted as right side up with very little down-elevator. At high rates, the Giles G-202 does split-second axial rolls. The rudder is very effective, yet the plane has almost no pitch or roll coupling; this enables the G-202 to perform many spectacular knife-edge maneuvers. The notes explain how to perform such maneuvers as the Lomcevák, torque roll, knife-edge loop and the knife-edge slip. I haven't tried all of these yet, but I intend to!

OK, how would you react to this statement? "Er, Gerry, I ah, just stepped on your wing and it sounded really bad!" My first reaction was to tell my flying buddy Larry to knock it off; I don't like bad jokes.... Imagine my surprise when I found out it wasn't a bad joke.

Repair Scale Stits Cloth

Invisible patches only you know are there



by GERRY YARRISH

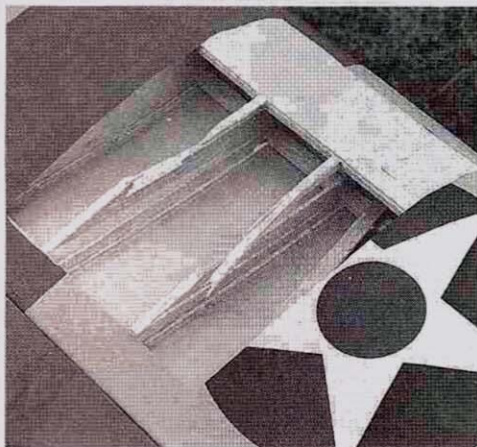
Accidents happen all the time, and you can either make the best of it or you can scream, jump up and down and invent new adjectives to describe your new found "wing walker." I made the best of it and wrote this "How To" article to help others who might find themselves in a similar situation. Mind you, these repairs are not limited to only size 11 damage inflicted by Reeboks or Nikes.

If you're far from home, make the necessary field repairs so you can salvage any remaining flight opportunities. If you're at home, just pack it in and head to the shop where you have all the tools required to patch the wing. Now, let's fix that wing.



Repairing Scale Stits is an easy task. You'll need M.E.K. solvent, Poly-Brush primer, Poly-Spray silver coat and Poly-Tone paint to match your old finish, sandpaper, masking tape, scissors, a sharp hobby knife and some sable hair brushes.

Keep some M.E.K. solvent in a glass jar so you can keep your brush clean and ready to use. After each use, place the brush in the M.E.K. This will keep the adhesive from clumping and building up on the bristles.



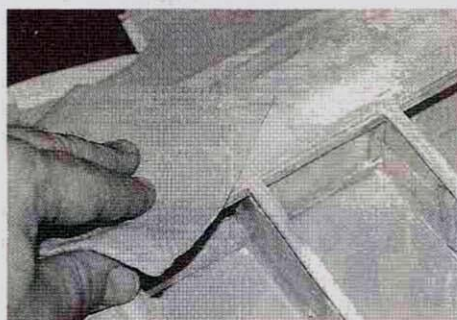
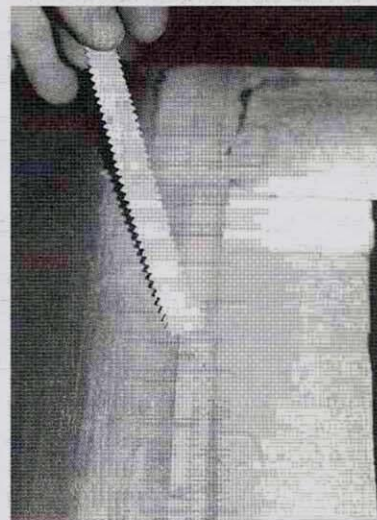
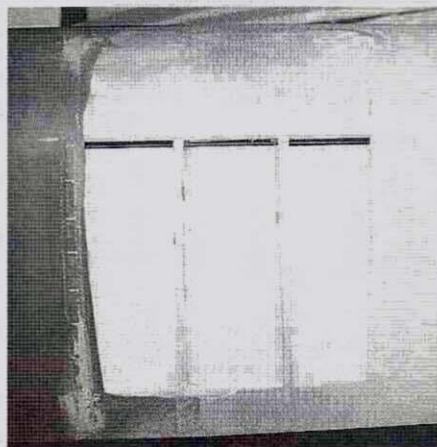
1 At the field, remove the covering above the damaged ribs (cut neatly and save the covering material) and extend the opening one rib bay on either side of the repair site. Save all the small pieces rattling around inside the wing and clean out the wing as best you can. Piece together the damaged ribs and glue everything with CA and kicker. (I used Pacer* thin and thick Zap for this). Add sheet balsa to either side of the damaged ribs and glue together.

If the spar or D-tube sheeting is also damaged, be sure to reinforce the damaged area properly. Sand smooth and then place the old covering back in place. Use a vinyl masking tape (clear in this case) to hold the cloth in place. Use plenty of tape and, if necessary, apply some thin Zap around the edges to hold the cloth securely in place. This temporary patch job will save your weekend but you should properly repair your wing as soon as possible.



2 Back in the shop, remove your field repair and take another look at your internal repairs. If you need to do some more work, now is the time to get it done. I have been using F&M Enterprises* Scale Stits fabric and paint for a while now, and I can tell you this stuff is extremely easy to work with and repair.

While wearing latex rubber gloves, soak some paper towels with M.E.K. solvent and start wiping down the covering about an inch or two past your repair opening. Replace the M.E.K.-soaked paper towels often, and slowly remove all of the old finish. The M.E.K. will remove all the previous coats of paint to expose the raw Scale Stits cloth underneath. If you have surface details such as rib stitching, these too can be removed easily with M.E.K. When you are done, you should have clean, raw cloth to attach your repair patch to.



3 To allow the patch cloth to lay flat on the wing, the edges of the old cloth that will be under the patch need to be feathered into the surface of the underlying balsa. F&M Feather Coat filler works well for this. Apply a thin layer of the filler around the parameter of the repair area and let dry. Sand flat with 320-grit sandpaper, and reapply the filler as often as needed to bring the surface of the exposed structure up to that of the old cloth.

Do not overlook this step as this would leave an unsightly ridge around the edges of the repair. Once the area has been sanded smooth, clean the area with a tack cloth to remove any dust.



4 Apply two coats of Poly-Tak adhesive to the repair area. Apply the adhesive to the balsa sheeting, the rib capstrips and to the cloth where the patch seam will be located. Also, apply a coat of the adhesive under the old cloth where it contacts the ribs and balsa sheeting.

5 Cut some new Scale Stits cloth to cover the repair area and make it about an inch larger than needed all around. Cover the repair area with the cloth and mark the cloth where it will need to be cut to fit properly into place. You'll want the edges of the patch to lay over the ribs on either side of the repair area, and you'll want these edges to be as straight as possible.

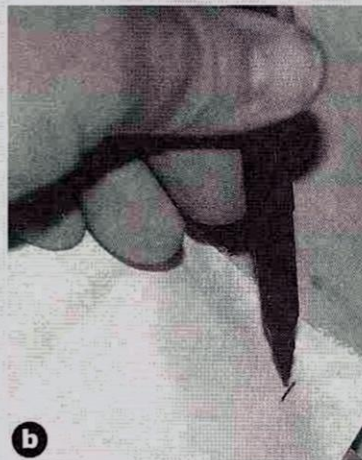
To prevent the cloth from fraying when it's cut, apply a coat of Poly-Brush primer to the cloth using your marks as a guide. Allow the primer to dry and then cut the patch cloth with a sharp pair of scissors.



a



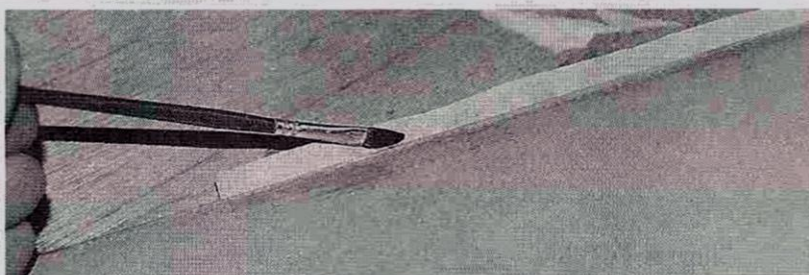
c



b



d

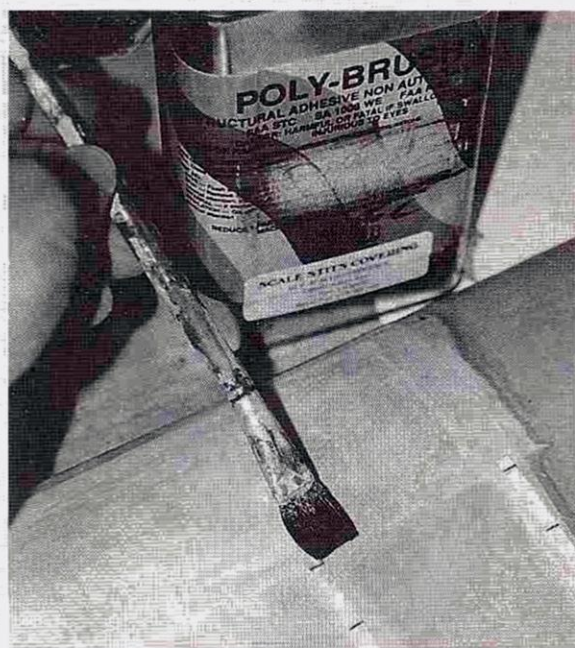


6 Lay the cloth into place and position it so that the edges overlap with the ribs on either side of the repair. To attach the patch, brush on some M.E.K. with a 1/2-inch wide sable brush and allow the solvent to soak through the cloth. The M.E.K. will activate the underlying Poly-Tak adhesive and will make the patch adhere in place. Pull the edges of the patch to remove any large wrinkles, but don't sweat any of the smaller ones. You will also need to apply adhesive to any edge that contacts the old finish such as at the underside of the leading and trailing edges.

Allow 30 minutes for the adhesive to set and then shrink out any remaining wrinkles using an iron set at about 250 degrees F. Scale Stits shrinks up to 25 percent when heated, so apply the heat evenly to the entire patch until it is shrunk tight. Don't allow the iron to contact the old painted finish as this may cause heat damage.



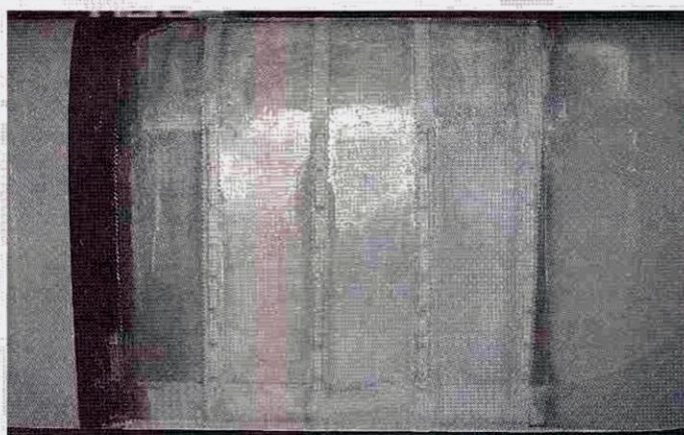
HOW TO REPAIR SCALE STITS CLOTH



7 Apply two coats of Poly-Brush primer to the patch and let dry. Apply a final "flow" coat of the primer to the patch as well as to the surrounding cloth to blend the patch into the old finish. If you had surface details, now is the time to reapply them.



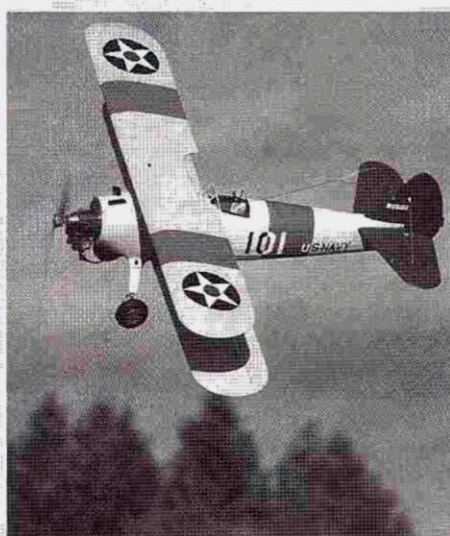
10 Once the Poly-Spray has dried (about 20 minutes), the patch is ready for the final two or three coats of Poly-Tone paint. Allow the Poly-Tone to dry for a day or two before you apply any decals, and you're done.



8 Here's what the new patch looks like after the Poly-Brush primer has been applied and the surface details have been added. Note that the primer has been applied over the old finish about an inch all around. Now lightly scuff the patch with a Scotch Brite pad to remove any dried-on dust and then wipe the entire wing panel with a tack cloth to make sure the surface is completely free of dust.



9 Using an airbrush, apply three light coats of Poly-Spray to the patch. Feather the silver coat over the old finish about 3 inches all around and allow to dry between coats. Apply each coat 90 degrees to the previous coat. I like to apply the Poly-Spray and the final coats of Poly-Tone paint while the wing is standing up on a wingtip. This allows the paint to be applied in a horizontal spray direction and it also prevents any drips from falling onto the finished wing.



11 With a new decal applied to the wingtip, the damaged Stearman is again ready to fly.

Once you've finished the repair, only you will know that any damage was done to your plane. With Scale Stits, repairs can be invisible. ✈



Fokker D-VII

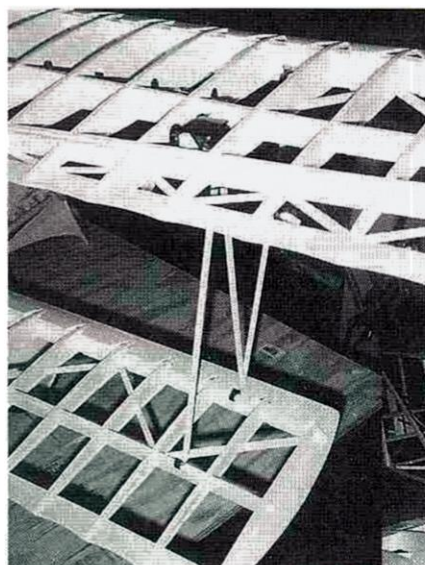
1/4-scale WW I German classic

by GARY ALLEN

THE FOKKER D-VII WAS arguably the finest fighter of WW I. The collaborative efforts of Anthony Fokker and his chief designer, Reinhold Platz, combined an immensely strong, welded-tube fuselage and empennage; thick, fully cantilevered wings; with a powerful, highly reliable Mercedes or BMW in-line 6-cylinder, liquid-cooled engine. The result was an aircraft that was easy to take off and land, stable and predictable in the air, while at the same time highly responsive and maneuverable.

A modern assessment of the D-VII design was provided by author/pilot Jeff Ethel in his article "Flying the Fokker D-VII," in the June '97 issue of *Flight Journal*.





Left: the wings for the Fokker D-VII are built in one piece and upside down over the plan. Here you can see the interplane strut in place. Made of music wire and covered with wood, the interplane struts are easy to fabricate and install. **Below:** the fuselage uses plenty of wood to take shape, and the cowl is made entirely of wood; no fiberglass parts are needed. The dummy inline engine and scale exhaust stack are also made of wood.



To me, the flying capabilities of the prototype, the many colorful, well-documented color schemes, and the features of the aircraft itself make the Fokker D-VII a compelling scale subject. The features I find especially appealing are the fully cantilevered wings with no wire bracing, the flat-sided fuselage, the good moments with a reasonably long nose, the large engine compartment, and the lack of hard-to-replicate surface details, such as in-the-wing radiators.

My design approach is very traditional, and I only use readily available modeling materials and hardware. True 1/4-scale was a requirement in order to use Williams Brothers' Spandau machine guns. My only dilemma in choosing 1/4-scale was that there were no appropriate size, scale WW I wheels commercially available at the time. The plans show the fabrication of such wheels from plywood and automotive heater hose, however, because Proctor Enterprises* now offers a museum-quality 1/4-scale D-VII, I assume they have appropriate wheels now available that could be used.

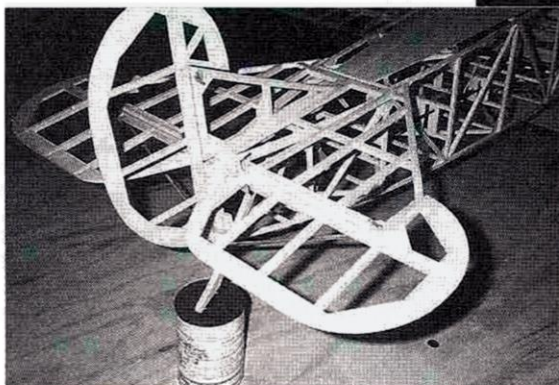
Another consideration was the exposed Mercedes or BMW engine. After studying the excellent drawing of the Mercedes 160hp engine in *Model Airplane News's* "Scale Aircraft Drawings," Volume 1, I felt I could fashion one from bits and pieces of balsa, basswood, brass stock, and hardware store springs, nails and washers.

I built my model around the SuperTigre* 2500 glow engine, but I think a Zenoah* G-38 or G-45 would be a better choice. Even with a

very light tail construction, my model required around 2 pounds of lead in the nose, so a gas engine with a good muffler and a large propeller would be perfect.

CONSTRUCTION

There is nothing particularly unusual about the construction of this model, but the sequence of events is important. Start by building two identical fuselage sides from 1/4-inch balsa sheet for the nose, 1/4-inch square spruce for the longerons and 1/4-inch square balsa for the uprights and diagonals. Note that the bottom of the 1/4-inch balsa sheet is left slightly oversize for subsequent blending with the nose blocks later. Also note that the cowl side should now be cut directly from the balsa nose sheet, to assure good fit. Do not forget the 1/4-inch ply inserts for the front cabane mount. I usually build the second side directly over the first, with waxed paper in



SPECIFICATIONS

Name: Fokker D-VII

Type: 1/4-scale WW I German fighter

Wingspan: 88 in.

Length: 69 1/2 in.

Weight: 21 lb.

Wing Area: 2,260 sq. in.

Wing Loading: 21.4 oz./sq. ft.

Airfoil: undercambered

Radio: 4 channels (rudder, elevator, ailerons and throttle)

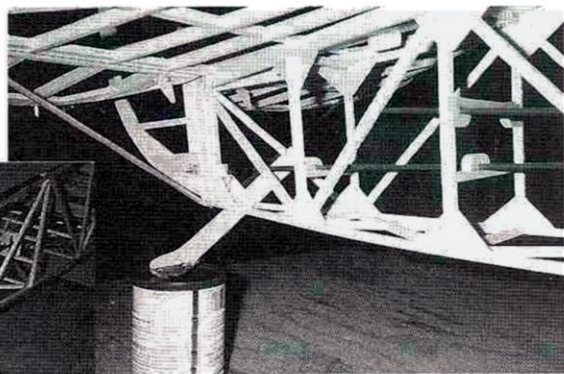
Engine used: SuperTigre 2500

Comments:

This 1/4-scale Fokker D-VII (FSP02981) uses traditional balsa and plywood construction and utilizes many standard, off-the-shelf hardware items readily available at the hobby shop. Originally powered by a SuperTigre 2500 glow engine, the D-VII would also be ideally powered by a Zenoah G-38 or G-45 gasoline engine. The use of a removable engine cowl and upper fuselage hatch makes radio and tank access very easy. And the removable tail helps make the model easier to transport.

between. Separate the sides and epoxy on the 1/16-inch ply doublers. Note that the doublers are notched for the landing gear and cabane mounts. Also add the 1/16-inch ply gussets. Be sure to make a right and left side.

Determine the exact firewall (F-2) location for the engine you are using and mark it on both fuselage sides. Also mark the position of horizontal former F-1; determine its exact length and cut out from 1/4-inch ply. Assemble F-3A, B and C, as shown, and then, with one fuselage side laid flat, epoxy F-2 and the assembled F-3 former in place, making certain everything



Above: to aid in ground handling, the author installed a steerable tail skid that is attached to the tail post with plastic mount brackets. Linkage attaches the tail skid to the rudder.

Left: the tail surfaces are also fairly easy to build. Start by building the outline structure and then fill in the ribs, center section and capstrips.

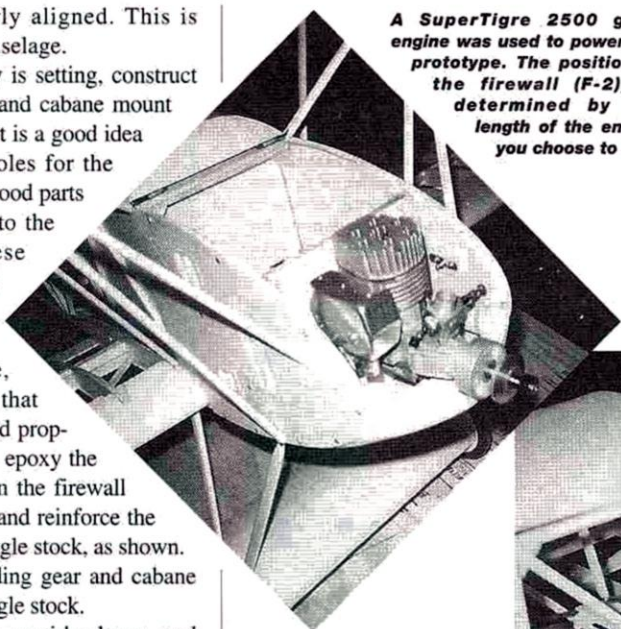
CONSTRUCTION: FOKKER D-VII

is square and properly aligned. This is critical for a straight fuselage.

While this assembly is setting, construct the three landing gear and cabane mount assemblies, as shown. It is a good idea to drill and tap the holes for the brass straps in the plywood parts before gluing them into the fuselage. Epoxy these assemblies in place and, while still adjustable, add the second fuselage side, again making certain that everything is square and properly aligned. When set, epoxy the F-1 pieces in place, pin the firewall with an $\frac{1}{8}$ -inch dowel and reinforce the firewall with balsa triangle stock, as shown. Also reinforce the landing gear and cabane mounts with balsa triangle stock.

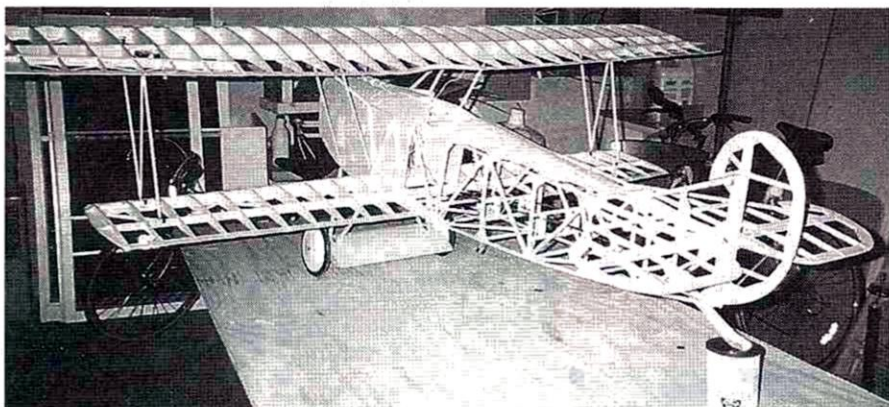
With the fuselage upside down and directly over the plan's top view, pull the fuselage sides together with the tail post in place. Add the top and bottom cross members, diagonal braces and $\frac{1}{4}$ -inch ply stabilizer mounts. Assemble and epoxy the lower wing mount in place. Assemble the tail-skid steering assembly and epoxy the $\frac{1}{8}$ -inch ply mount in place. Add formers F-4 through F-7 and add the top stinger and sheeting. Use $\frac{1}{4}$ -inch balsa sheet applied cross-grain to form the fuselage bottom just aft of the lower wing cutout and forward between the rear and front landing gear mounts. Use balsa blocks to form the bottom cowl, as

A SuperTigre 2500 glow engine was used to power the prototype. The position of the firewall (F-2), is determined by the length of the engine you choose to use.



The bottom wing is attached with bolts from the inside of the fuselage to ensure a scale outline. Access to the bolts is gained by moving the top fuselage hatch.

The removable cowl is best fabricated on the fuselage. Very lightly, tack the $\frac{1}{4}$ -inch balsa sides in place. Glue the cowl formers C-1, 2, 3 and 4 assembly in place. Tack-glue C-6 in place. Plank the cowl top with two layers of $\frac{1}{8}$ -inch balsa, as shown. Add the radiator top block and the $\frac{1}{16}$ -inch ply radiator facing pieces and C-5.



There's nothing quite as beautiful as a completed airframe before it is covered. Here, the bare bones of the Fokker D-VII give you an idea of just how elegant the model really is.

shown. Access holes may be needed for engine mounting. For the SuperTigre, the scale lower cowl vent proved just right. Exhaust ports also need to be provided, of course. Adding the front cowl mounts to F-1, as well as the top deck and instrument panel mounts, completes the basic fuselage structure. Do not glue the cowl sides into place at this time; this occurs after covering.

Remove the assembly from the fuselage to shape and sand it, then finish the engine cutout and glass the cowl top with 2-ounce fiberglass cloth and epoxy. With the cowl in place, drill holes for the 4-40 socket-head bolt and blind-nut mounting system. Finally, drill and glue in place the $\frac{1}{4}$ -inch dowel rear mounting pin.

The removable top deck is built around

a $\frac{1}{4}$ -inch square balsa framework. After you have glued the framework together, add the $\frac{1}{4}$ -inch ply hold-down gussets, the formers and the stringers. Sheet with $\frac{3}{32}$ -inch balsa, add the $\frac{1}{32}$ -inch ply edge strips on each side and sand. Glass the top deck with 2-ounce fiberglass cloth and epoxy.

CABANE STRUTS

First, construct the top wing alignment jig of spruce stock, as shown, and tack glue to the



fuselage sides. Next, add the $\frac{1}{4}$ -inch square spruce piece to locate the front cabane members. Bend the $\frac{5}{32}$ -inch music wire front and rear cabane pieces, remembering to make right and left versions. It is advisable to trial-fit as you go along. When satisfied with the fit, secure the wire in place. This involves fabricating the wheel collar and brass-strap assembly for the nose members and the brass clip for the top deck members. Be sure to file a flat on the nose cabane piece for the wheel collar setscrew. When they are secured to the fuselage, bind the three front cabane wire members together with copper wire and solder. Add the $\frac{3}{32}$ -inch music-wire locating pin to the rear cabane, then bind and solder. Shroud the wire cabanes with basswood, as shown, carve and sand to the final streamlined shape. Leave the top wing alignment jig in place for now.

LANDING GEAR

Since I am not particularly adept at soldering and have no experience brazing, I designed the landing gear to have no high-stress joints. As described in the flying section, I have really put this system to the test, and it performed perfectly. Bend the main landing gear legs from $\frac{3}{16}$ -inch music wire. Be sure to make a left and right version. Join them with brass tubing and solder. Either mount the resulting assembly to the fuselage with brass straps and wood screws, as shown, or mount in a fixture to hold the

assembly square and rigid. Bind and solder the short $\frac{3}{16}$ -inch diameter spreader bar supports and the $\frac{3}{32}$ -inch travel limit pieces to the main structure, as shown. Next, bind and solder the two $\frac{5}{32}$ -inch spreader bars to the spreader bar supports. Be sure the spreader bars extend beyond the supports to provide ample room for attachment of the five no. 64 rubber band bungees. Be sure to use $\frac{1}{4}$ -inch music wire for the axle.

To provide access to the landing gear structure, the landing gear wing fairing is designed to come apart along the axle line. This makes it very easy to change the rubber band bungees or to realign the structure in case of a hard landing. First, fabricate the $\frac{1}{4}$ -inch ply landing gear mounts. These

will be attached to the spreader bars, as shown. Begin construction with the $\frac{3}{32}$ -inch balsa sheet bottom and $\frac{3}{32}$ -inch ply inserts. Add the bottom spars and, with the $\frac{1}{4}$ -inch ply landing gear mounts in place to ensure good fit, glue the $\frac{1}{4}$ -inch spruce frame in place. Add the ribs, false leading edge, top spars, top sheeting and the $\frac{1}{2}$ -inch balsa leading edge. Carve and sand to shape. Add the $\frac{1}{32}$ -inch ply facing at the ends. Attach the ply landing gear mounts to the spreader bars, as shown. Slip the completed landing gear wing front and rear sections in place. Mark and drill pilot holes for the eight wood screws, as shown.

WHEELS

Start by cutting out the necessary plywood disks. Drill the appropriately sized center hole to accommodate the $\frac{1}{4}$ -inch i.d. brass tube. Cut the brass tube to length. Cut the $\frac{1}{8}$ -inch lite-ply spokes slightly oversize and make sure they are perfectly square. Support the $\frac{1}{8}$ -inch lite-ply disks solidly all the way around with $\frac{3}{16}$ -inch

scrap stock. Place the $\frac{1}{4}$ -inch i.d. brass tube in place, and make sure it extends the full $\frac{3}{16}$ inch below the $\frac{1}{8}$ -inch lite-ply disk. Now very carefully epoxy the spokes in

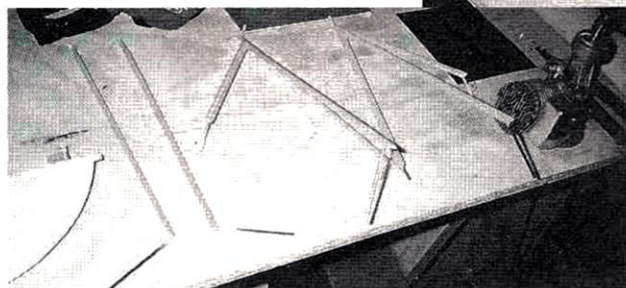
place. Square alignment of the spokes with the disk and with the brass tube will ensure true running wheels. When dry, epoxy the other $\frac{1}{8}$ -inch lite-ply disk in place. Carefully sand the 16 spokes to be exactly flush with the disks. Epoxy the $\frac{1}{32}$ -inch ply rims in place sequentially. Next, add on the outer ply disk made of two $\frac{1}{32}$ -inch ply disks epoxied together. Now, the tricky part: cut the 1-inch o.d. black rubber automotive heater hose to exact length. The bad news is that this will doubtlessly require several tries; the good news is that the stuff is cheap. I

found that medium viscosity CA provides an exceptionally strong bond. When the tire is finally complete, apply some PFM* or Household Goop to the rim, slip the tire on the rim and snug it up against the outer ply disk. Add more Goop, then epoxy the other outer ply disk in place and add the two $\frac{1}{8}$ -inch ply hubs. All that is required now is to add the outside $\frac{1}{32}$ -inch ply covers.

Right: the removable engine cowl (complete with dummy in-line engine) and the fuselage hatch (with machine guns) are made of wood and covered with 2-ounce fiberglass cloth. Removal of these parts gives me excellent access to the inside of the model.



Above: the tail components are also removable, allowing access to the inside of the fuselage. Three bolts hold the horizontal stab in place, while the fin attaches to the stab with tabs keyed into slots. Struts and rigging wires add rigidity to the tail group.



First, cut out the $\frac{1}{8}$ -inch balsa spokes and glue in place. Next, cut out the $\frac{1}{32}$ -inch ply cover. Start with a disk of the same diameter as the outer ply disks. Make a single radial cut from the center to the edge along the radius of the disk. Place the cover in place and overlap the cut edges until the correct conical shape is achieved. Mark and cut. Epoxy the cover in place, with the cut edges forming a perfect butt joint over one of the ribs. If done carefully, the butt joint will be invisible after it is sanded and filled. The wheels are now complete. As mentioned, I have tested these wheels under very harsh conditions, and they have performed flawlessly.

EMPENNAGE

The entire tail section is designed to be completely removable. The horizontal surfaces are held to the fuselage with three bolts. The vertical fin is attached with two fin tabs that key into slots in the stabilizer. Also, the lower two rudder hinges are held into the fuselage tail post by screws. To build the stabilizer, glue the outer balsa framework pieces together first, then position and glue into place the $\frac{1}{16} \times \frac{1}{4}$ -inch bottom rib capstrips and $\frac{1}{16}$ -inch ply center section piece. Add the spars, ribs and then the top capstrips. Next, add the $\frac{1}{4}$ -inch balsa center section and $\frac{1}{16}$ -inch ply center section top piece. Finally, inlay the $\frac{1}{16}$ -inch ply brace reinforcement pieces, as shown. The elevators are very straightforward to fabricate and are built using $\frac{3}{8}$ -inch-thick balsa.

TOP WING

Both wings are built in one piece, upside down, directly over the plan. Start by pinning the front and rear spar jigs for the



Left: here, the removable cabane struts are free of the fuselage. Covered with wood and painted, they add greatly to the scale appearance of the model.



The fully detailed cockpit in the prototype model and the 1/4-scale Williams Bros. Spandau machine guns make the D-VII come to life. The author added much surface detail to his Fokker and qualified for the Scale Masters.

top wing to the flat building board. Note that the front spar jig is just 1/4-inch square balsa stock. Think through the orientation of the rear spar jig to make sure you get it right. Place the spars on the jigs, and weight them down (I used my set of box wrenches). Epoxy the central front spar joiner in place. Glue the ribs in place, making sure they are square to the building board. Add the bottom spars, noting the portion to be omitted for the wing cabane mount. Epoxy the two 1/8-inch ply WS parts, as shown, and make sure you have excellent glue joints. Do not add the 1/4-inch ply wing cabane mounts at this point. Add the false LE, the TE, the aileron facing, the center section TE laminations and the sheer webbing. Install the 1/4-inch balsa diagonal braces, as shown. These should be flush with the bottom spars. Since these braces span every second rib, you will need to notch the intermediate ribs appropriately. Add the 1/4-inch ply servo plate mounting gussets, as shown.

After shaping the false LE, add the LE sheeting. It is best to use the notch pattern for the upper wing LE sheeting to mark the positions on the spar to which the sheeting will be glued. Then add the capstrips and remove the wing from the building board. Although the structure at this point is fairly rigid, take care to avoid building in warps or twists while adding the top LE sheeting and capstrips. Mark off the attachment points on the spar for the LE sheeting, as before. To achieve the proper airfoil, balsa fill is required between the spar and the LE sheeting. Make the appropriate pieces from 1/32x1/2-inch balsa and glue into place on the

front spar. Sand these fill pieces to shape, using the ribs as guides. Add the LE sheeting and capstrips.

Make up the three LE pieces from 1/2-inch balsa sheet. A trick I used to help in shaping the LE is to insert 1/16-inch ply patterns between the LE pieces and at their outer edges while I glue the LE pieces to the false LE. Plane and sand the LE to shape. Make up the tip pieces from 1/8-inch balsa and laminate them over a pattern to get the undercamber shape correct and glue to W-13U. Cut the 3/32-inch ply servo hatch to size and glue the 1/4-inch ply servo mounts in place. Build the servo wire outlet as shown.

The ailerons are made by pinning the trailing and leading edges to the building board and then adding the bottom capstrips, ribs and control horn mount. Note that the LE is notched to receive the aileron tip piece. Add the tip piece, noting that it has slight positive incidence, and add the diagonal bracing. Add the top capstrips, then plane and sand the aileron's LE to shape. Carefully cut the hinge slots into both the aileron and wing positions.

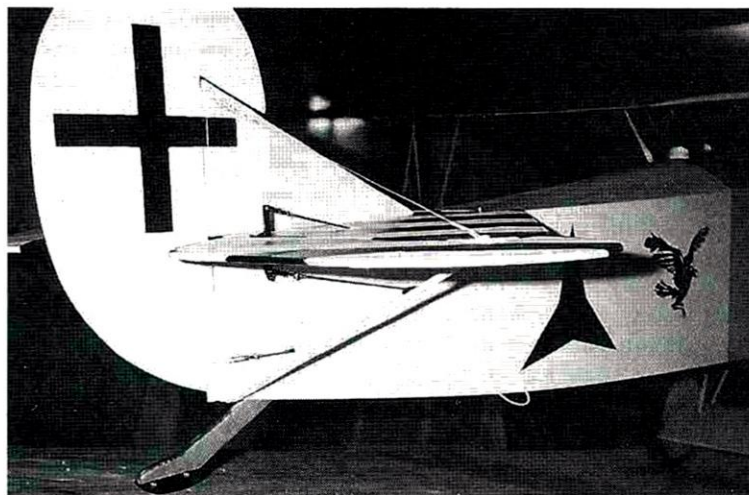
After sanding the entire wing to shape, use the upper wing notch pattern to notch the top and bottom LE sheeting. Handle with care at this point because, until the covering is applied, the LE sheeting can be easily split.

3/32-inch i.d. brass tubing attached to the front and rear spars, with braided nylon fishing line epoxied in the positions shown. The 90-degree bent ends of the strut wires slide into the tubes and are held in place by simple clips fashioned from 1/32-inch brass stock and small wood screws, as shown in the detailed drawing.

ASSEMBLY AND ALIGNMENT

This is best done with the landing gear removed from the fuselage. Working from the fuselage plan side view, carefully mark the position of the lower wing on the fuselage. Check again to make sure that the top wing alignment jig is properly positioned. Prop the lower wing in position and check to make sure that the tips are equidistant to the tail post, that is, square to the work bench. Drill the hold-down bolt holes and attach the lower wing with 6-32 bolts and blind nuts, as shown. Trim or shim the front and rear spars where they contact the fuselage to adjust the wing's incidence and angle to the fuselage. Attach the front and rear cabane assemblies.

At this point, fabricate the wing cabane mounts from 1/4-inch and 5/32-inch ply, 1/16-x1/2-inch brass straps, 4-40 socket head bolts and blind nuts, as shown. Attach the wing cabane mount assembly to the cabanes and make sure everything is



Here, the tail group is attached to the fuselage. Note the dummy elevator pushrod assembly on the top side of the elevator for scale appearance. The tail skid has a metal shoe attached also.

BOTTOM WING

The bottom wing is built exactly like the upper wing. Again, be very careful to think through the proper orientation of the spar jigs. It is shown on the plans, with both the front and rear jigs increasing in thickness toward the wingtips. Also study carefully the construction of the center section, noting that the front spars are reduced from 1/2-inch to 1/4-inch width for proper fit, with the fuselage lower wing cut out.

The interplane strut attachments are very simple. They consist of 1/4-inch long,

correctly configured. Carefully place the top wing in position, making sure the wing cabane mounts sit appropriately in the WS-1 and WS-2 notches. Adjust the top wing to be parallel to the bottom wing when viewed from the top. Shim and trim the WS pieces until the top wing just rests on the alignment jig. Shim and trim the lower wing center section spars, if necessary, to obtain equal right and left inter-plane distance. At this point, install the interplane struts. The interplane struts are adjustable for length by virtue of the brass tubes used

FLIGHT PERFORMANCE

completely. I powered mine with a SuperTigre 2500 fitted with an O.S. Max 7D carburetor swinging a 20x6 Master Airscrew Classic propeller and standard 5 percent nitro glow fuel. Before flying, make certain it balances correctly!

• Takeoff and landing

Takeoffs are very easy—nothing tricky at all. Just hold a little up to keep the tail down as the throttle is advanced, and it starts to roll. Generally, very little, if any, rudder correction is required. In a crosswind, it will tend to weather-vane into the wind, but the rudder is very effective. At full power, liftoff occurs between 20 to 30 feet. The ailerons are effective even at takeoff, but I always use a bit of coordinated rudder for smoother response. At the 1997 Mint Julep scale meet in Rough River, Kentucky, I had my first experience taking off from tarmac with the D-VII. Tail draggers with tail skids and tarmac runways are not the best of combinations, however, I had absolutely no problems. The D-VII tracked straight and true and lifted off in a very short distance. In around 40 flights off both grass and tarmac, I haven't seen even the slightest hint of ground looping tendencies. A key to good landings is to keep a bit of power on until just prior to touchdown. With all the drag inherent in this machine, power off is like hitting a wall.

• General flight characteristics

The model is very solid and stable in level flight, even under gusty wind conditions. Turns are best made with enough coordinated rudder, to keep the tail up. It is capable of very slow flight, with the con-

trol surfaces remaining surprisingly effective even at a virtual standstill. Well defined chandelles, fly pasts and spiral descents are easily performed and are very pleasing. Flown in 25mph winds, I was very surprised and pleased with how well the D-VII handled these marginal conditions.

Stalls are very characteristic of the full-size machine. As the model approaches a stall, it just mushes forward, barely dropping its nose, and the ailerons remain amazingly effective, even with no apparent flying speed.

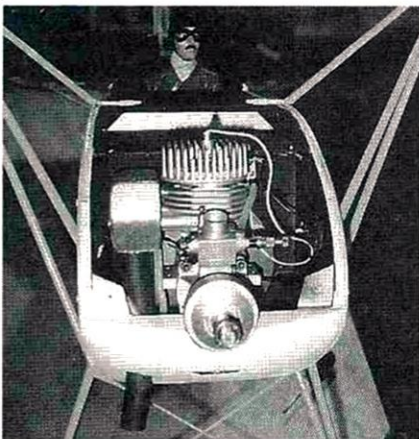
Stalls are very characteristic of the full-size machine. As the model approaches a stall, it just mushes forward, barely dropping its nose, and the ailerons remain amazingly effective, even with no apparent flying speed.

• Aerobatics

While certainly not as aerobatic as a Bücker Jüngmeister, this Fokker D-VII, like the original, is quite agile and is capable of most standard pitching, rolling and stalling maneuvers. Rolls are best accomplished with coordinated rudder. It will not axial roll, of course, but it will do a very nice barrel roll. Advance the throttle, pull the nose up about 20 degrees and apply full left or right aileron with 20 to 50 percent coordinated rudder, and it will complete a roll in 2 to 3 seconds and exit with the wings level and at neutral pitch, with almost no loss of altitude.

Stall turns and wing overs are very straightforward, recognizing, of course, that the vertical performance of any WW I fighter, with anything approaching scale power, is very limited. For any maneuver requiring a vertical line, a reasonably steep dive is necessary.

The model is capable of inverted flight, but it is not an elegant sight—with its nose pitched skyward at about a 30-degree angle—making almost no headway despite the full-throttle setting. I have not yet persuaded the D-VII to execute any maneuver that resembles a snap or flick roll. Perhaps I do not have enough control surface deflection, or perhaps the design is just not compatible with such gyrations. In any event, with this machine, I do not miss them.



Engine cowl removed shows plenty of room for any engine you would care to use for power. Here, the SuperTigre 2500 and muffler have room to spare.

in their construction. When satisfied that the interplane distances are as identical as possible, carefully remove the interplane struts and solder the slip joints. You should now have a nearly identical left and right pair. Reinstall the interplane struts and permanently attach the wing cabane mount assemblies to the upper wing with generous amounts of slow epoxy. While the epoxy sets, check and recheck everything for proper configuration and alignment.

With the upper and lower wings still in place, position the stabilizer. After making certain that the wing and stabilizer trailing

edges are parallel in the top view, drill the stabilizer attachment holes. Attach the stabilizer with three 4-40 blind nuts and bolts (two socket-head bolts in the front and a flat-head bolt in the rear). Next, shim, if necessary, to align in the horizontal plane. Cut the 3/16-inch aluminum brace tubes to length and install under the stabilizer, as shown. Install the fin, check for alignment and install the wire bracing. Now disassemble everything, and do not forget to shroud the interplane struts with basswood.

CONTROL LINKAGES

I used standard size servos fitted with Du-Bro* heavy-duty servo arms throughout, with separate servos for each aileron and elevator. I also used 4-40 wire pushrods for the elevators and rudder. Be sure to amply support these pushrods within the fuselage. I also used 4-40 size linkages for the ailerons. The servo extensions were painted black as they exit the upper wing, just where the aileron cables exit in the prototype. They look reasonably appropriate. I used a linkage from the rudder to the steerable tail skid, as shown in the plan, but a separate pushrod could also be used.

COVERING AND FINISHING

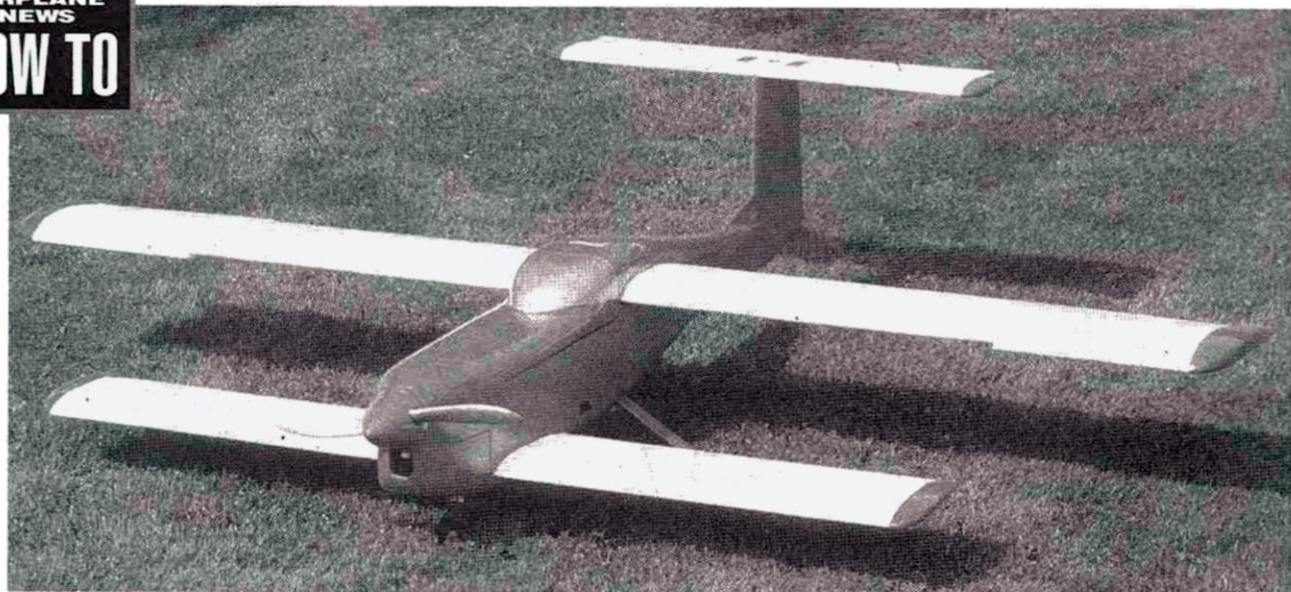
I covered the entire airframe in white Solartex*. Although rib stitching was used on the prototype, it generally cannot be

seen from any distance at all, so I chose not to duplicate it. Rib tape (3/8-inch wide strips torn from Solartex) was added. I think it stands out just the right amount. The covering on the fuselage was extended about an inch into the 1/4-inch balsa-sheeted area. The assembled and primed cowl sides were then glued into place. The removable cowl top and deck were glassed with 2-ounce cloth and primed with automotive primer. I used HobbyPox* enamel to reproduce the red, white and black scheme of Jasta 18.

The surface details that should be included in any rendition of the D-VII include the exposed portion of the engine, the cowl panels, vents and cutouts, radiator cap and, of course, the Spandau machine guns. Without too much extra effort, cockpit detail and a reasonable simulation of the scale control surface cabling and hinging can be added. As mentioned before, there is no shortage of interesting and colorful D-VII schemes to choose from.

In conclusion, this 1/4-scale version of the Fokker D-VII has certainly exceeded my expectations in every way. It is tremendously fun to fly under a wide variety of conditions; it is robust enough for everyday flying. And the D-VII is scale enough to have qualified for the Scale Masters Tournament.

*Addresses are listed alphabetically in the Index of Manufacturers on page 126.



The Wild Goose 3-surface hybrid design combines biplane and canard technology.

Biplane Design

Understanding the basics

by ANDY LENNON

DURING THE 1920s AND '30s, biplanes were popular for aircraft of all types: sport, trainers, transports, flying boats, etc. The Beech Staggerwing was the Cadillac of personal aerial transportation. Experience in the Spanish Civil War and WW II proved that sleek monoplanes with retractable landing gear and flaps were much superior to the biplanes of that era and today, few biplanes are being produced, Pitts and the Ultimate, to name two.

Another not-so-evident change—the emergence of stressed-skin construction—took place almost simultaneously. Most biplane fuselages were composed of a load-bearing, welded-steel tube structure on which formers, stringers and fabric provided the external aerodynamic, but non-load bearing, shape. Wings were largely wood with drag bracing, fabric covered and were externally braced with N-struts and flying wires.

In contrast, in stressed-skinned monoplanes, the structure both supported the loads and provided the aerodynamic shape. The result was simpler construction with fewer parts. Modern composite construction improves on the all-metal versions. Biplanes and round engines have a nostalgic appeal for many modelers, and these articles are for their benefit.

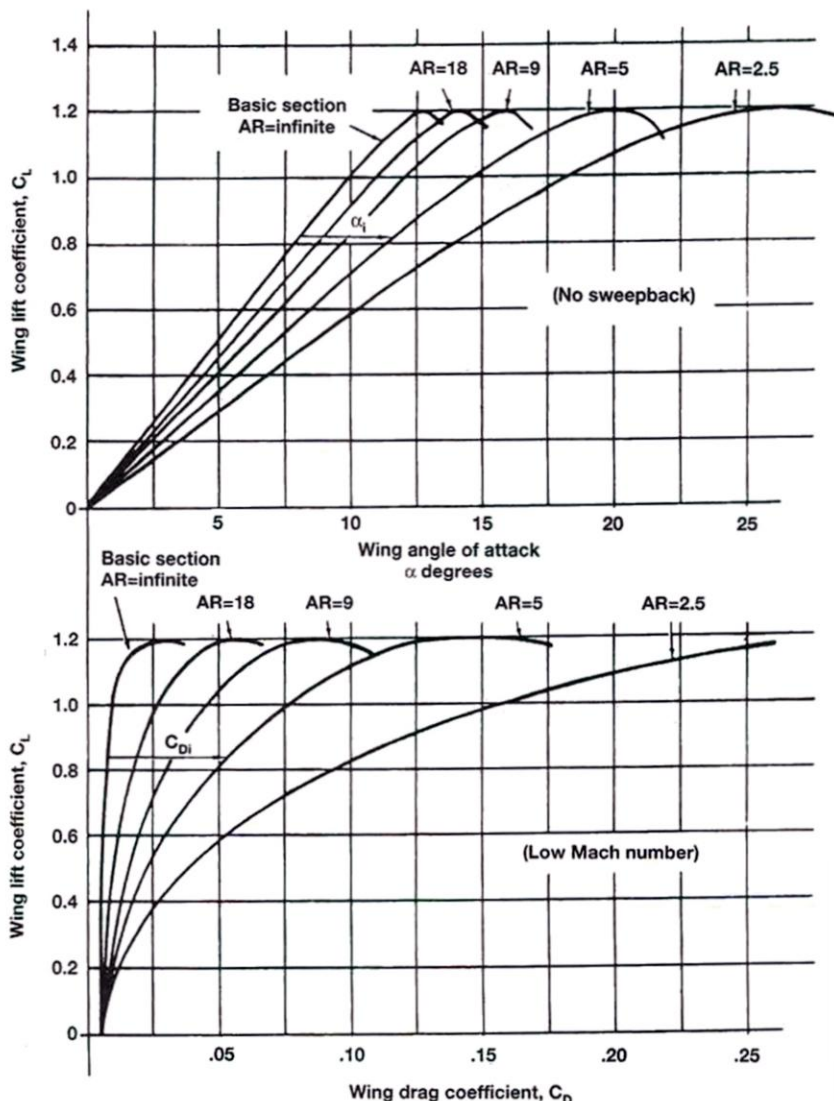


Figure 1. Effect of aspect ratio on wing characteristics.

BIPLANE PROS AND CONS

• **Structurally.** A full-scale biplane is smaller in span and length than a monoplane of equal wing area and aspect ratio (AR). The widely separated upper and lower wings act as flanges of a spar. The outer N-struts, cabane and fuselage, along with the wire bracing, provided a light but very strong, torsionally resistant structure weighing 60 percent of an equivalent monoplane's wing weight.

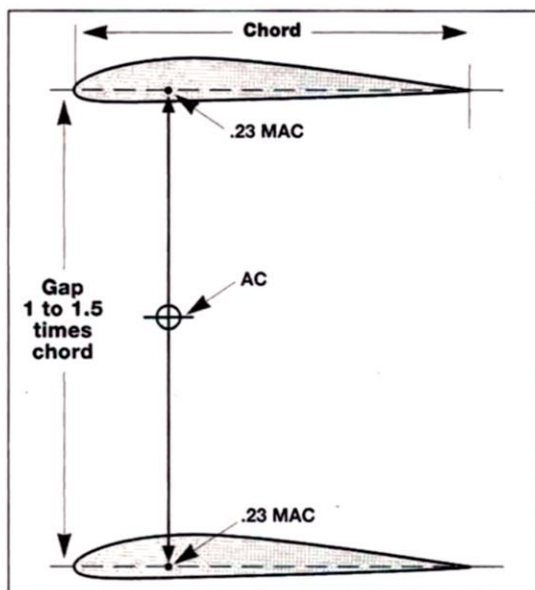


Figure 2. Gap for an orthogonal biplane and AC location.

Unfortunately, most model biplane designs do not take advantage of these structural advantages; few have functional wire bracing and N-struts.

• **Aerodynamically.** A biplane's wings have mutual interference; a loss of maximum lift and considerably more drag at intermediate lift coefficients (C_L); the N-struts and bracing certainly contribute drag. Also, the wings' chords are shorter than those of a monoplane wing, so that scale effect increases drag and reduces lift.

Two wings in biplane combination, however, produce the same result as reducing the aspect ratio of a single wing. The effect is to decrease the slope of the lift curve, increase the angle of maximum lift and slightly round out and flatten the peak of the curve. See Figure 1 and compare AR 5 to AR 9.

Biplane wings stall at higher angles of attack with a gentler stall than that of the same airfoil section on a single wing.

BIPLANE DESIGN VARIABLES

Biplane design requires consideration of many more variables than for a monoplane design.

• **Wing area.** It is suggested that a 10-percent increase in area, compared to an equivalent monoplane, be incorporated. A 600-square-inch monoplane wing of AR 6 would have a span of 60 inches and a 10-inch chord.

The biplane equivalent would have a total area of 660 square inches (or 330 square inches each), a span of 44.6 inches and a chord of 7.4 inches for each wing. At 60mph, the monoplane wing is flying at a Reynolds number (R_n) of 460,000. Each of the biplane's wings is operating at R_n 347,000 at the same speed.

Most aerodynamicists agree that the most efficient biplane arrangement is to have both wings of equal span, chord, wing area and angle of incidence. There is little justification for using ARs greater than 6; higher ARs result in narrower chords and more adverse scale effect at the resulting lower R_n s.

The following important variables will be discussed in this article: gap; stagger; decalage; biplane wing areas; center of lift or aerodynamic center (AC); CG location.

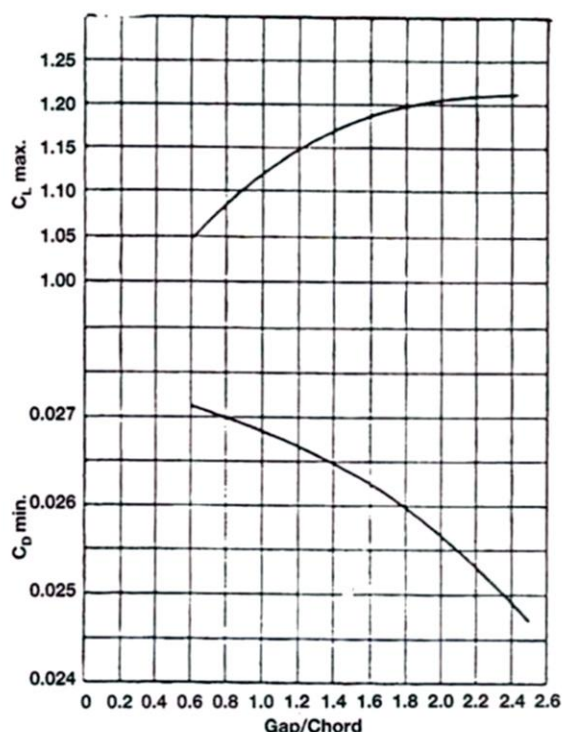
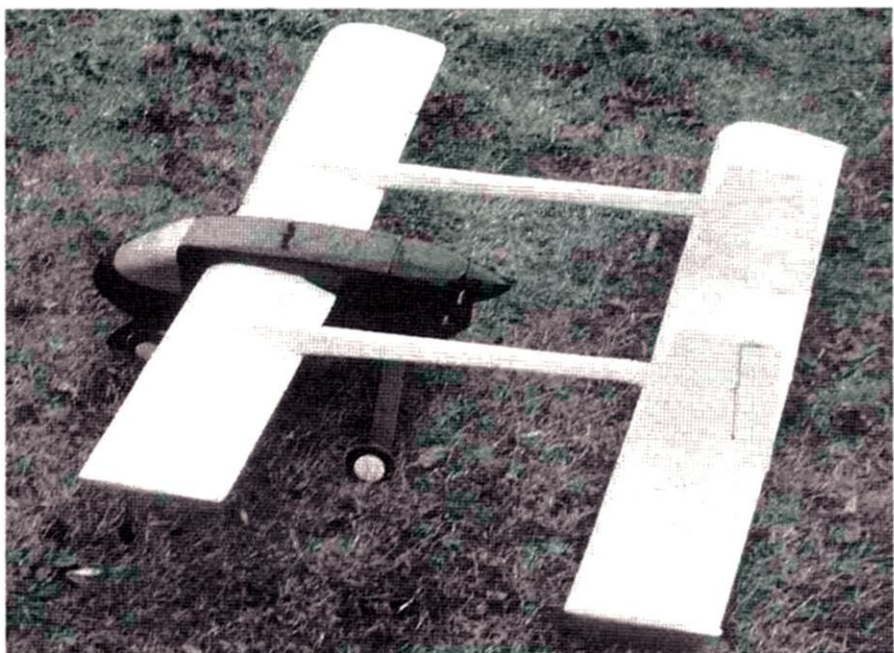


Figure 3. Variation of lift and drag characteristics with gap/chord ratio.

In Part 2 of this article, the following will be discussed: roll control; tail moment arm and area; wing loading and flaps; dihedral; wing sweepback; airfoils; level flight angle of incidence; pitching moments; wake, downwash and horizontal tail location.

GAP

Gap is the vertical separation of biplane wings and is one of the most important



The author's Wasp tandem-wing biplane with large stagger, the horizontal tail is eliminated, but canard principles apply.

BIPLANE DESIGN

variables in biplane design. It is measured in terms of the upper wing's chord, as in Figure 2. As Figure 3 illustrates, the greater the separation, the higher the C_L max and the lower the drag coefficient (C_D). Obviously, a gap of 2.5 times the chord is structurally unrealistic; gaps below 1.0 times chord exact a heavy penalty. Gaps of 1.0 to 1.5 times chord are compromises. When biplane wings are vertically aligned, the result is an "orthogonal" biplane (Figure 2).

STAGGER

When the upper wing is located ahead of the lower wing as in Figure 4, the combination has positive stagger. When the lower wing is ahead of the upper, the result is negative stagger. Stagger is measured in terms of the upper wing's chord.

Stagger does little to improve biplane efficiency and is used primarily for structural considerations or to improve the pilot's view. The Beech Staggerwing is a classic example. The forward lower wing houses the retractable landing gear, and the rearward location of the upper wing provides a wide field of view. Its negative stagger is 50 percent of the wing's chord.

In ground effect, the lower wing of a negatively staggered biplane is closer to the ground and produces additional lift in ground effect. That provides a natural assist in both takeoffs and landings. Positive stagger has the opposite effect since the lower wing's AC is behind the CG.

Stagger of 95 percent of chord is the

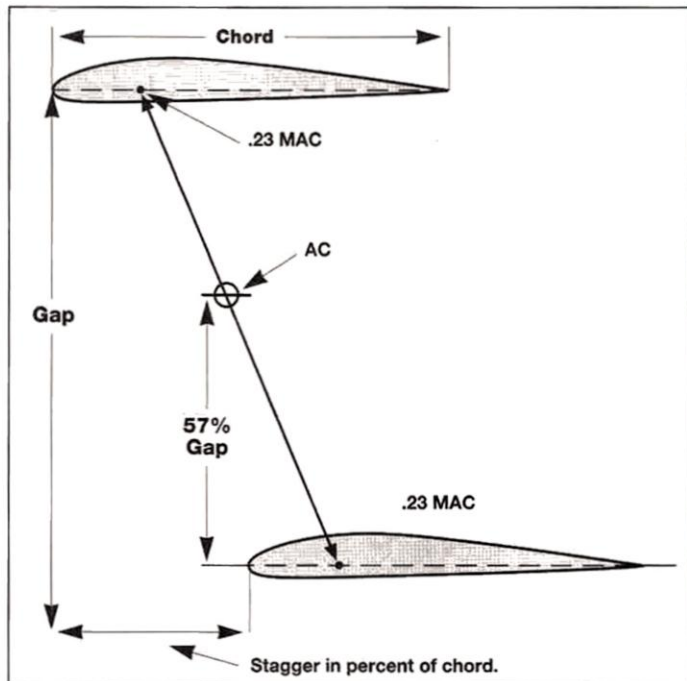


Figure 4. Positive stagger and AC location.

maximum for biplane design where, for design purposes, the wings are considered as one. Stagger greater than 150 percent of the main wing's chord (such as in the author's Wild Goose in photo 1) results in each wing tending to operate separately. The wings' centers of lift are widely separated and downwash comes into play. Canard technology must apply.

DECALAGE

Positive decalage is the setting of the upper wing at a larger angle than the lower. Negative decalage has the lower wing at the higher angle (see Figures 5A and 5B). Neither setting does much to improve biplane efficiency, although positive decalage of one degree results in minor improvement. It also permits the forward

upper wing to stall first, losing lift; with the CG ahead of the AC of the unstalled lower rearward wing, there is a natural stall recovery force couple.

Decalage proves to have little or no effect on the location of a biplane's aerodynamic center.

STAGGER AND DECALAGE COMBINED

Combining positive stagger and positive decalage acts like the reflexed trailing edge of a low-pitching moment airfoil. Stagger of 75 percent and with positive decalage of 6 degrees would result in a biplane that is stable in pitch and independent of a horizontal tail.

BIPLANE WING AREAS

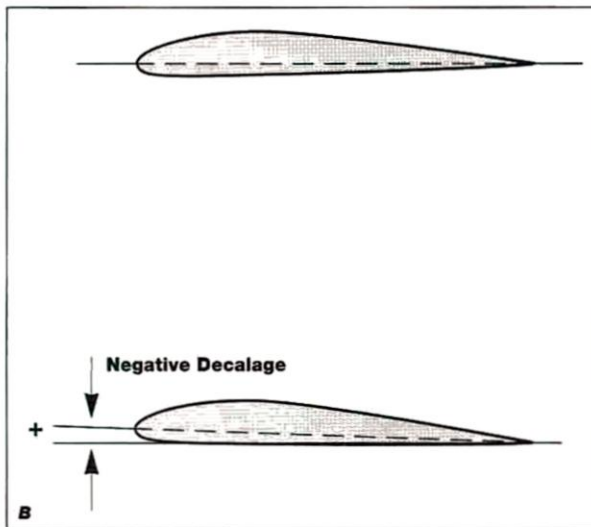
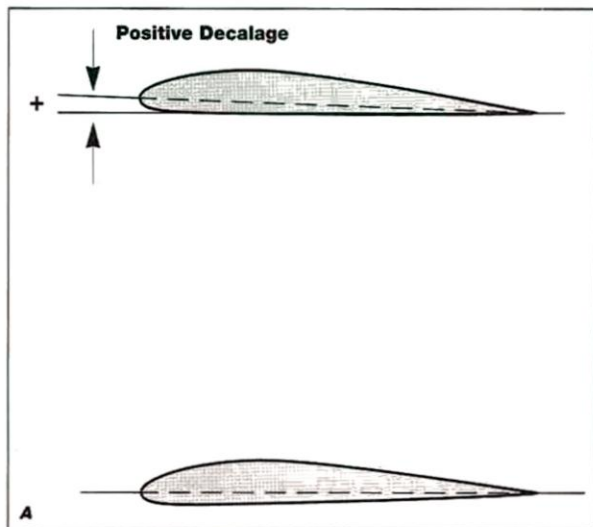
As mentioned, biplane wings of equal area, chord span and aspect ratio, with adequate gap are the most efficient; however, many biplanes have been designed with the lower wings smaller than the upper.

Clipping the lower wing's span but retaining the same chord as the upper wing results in higher induced drag. To avoid this, the lower wing should have the same aspect ratio as the upper. This results in a narrower lower wing chord which, on smaller models, would have adverse scale effects. Figures 6 and 7 provide comparisons of upper and lower wing lift and drag characteristics for orthogonal biplanes.

AERODYNAMIC CENTER (AC) LOCATION

For a biplane, locating this center is not difficult. First, the AC of each wing lies

Figures 5A & B. Positive and negative decalage.



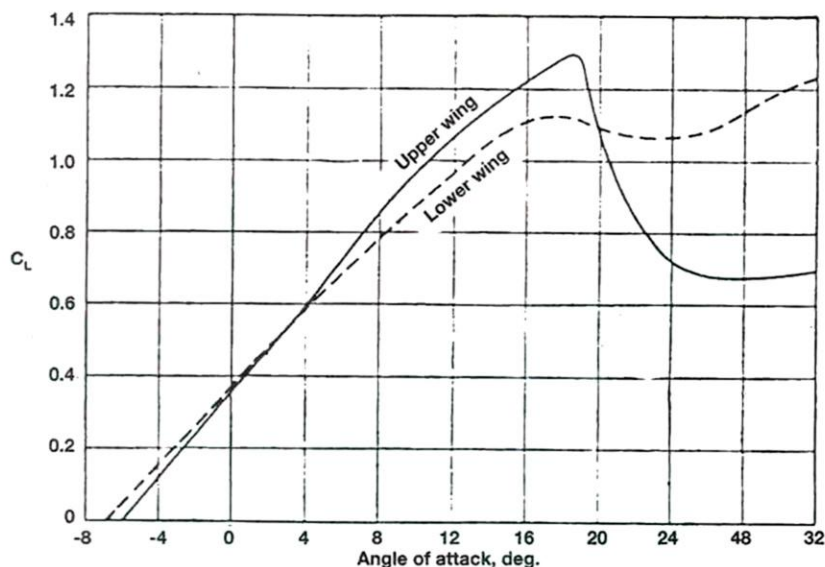


Figure 6. Lift characteristics for the upper and lower wings of an orthogonal biplane.

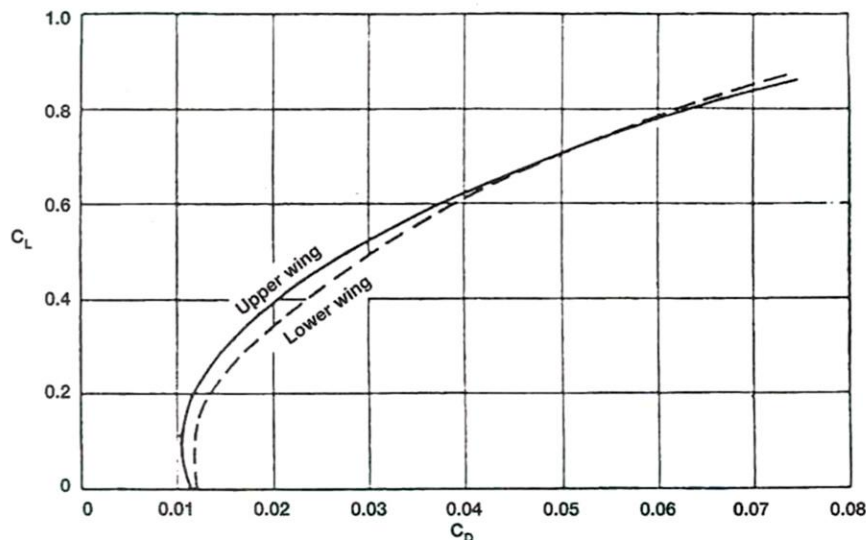


Figure 7. Comparison of the polars for the upper and lower wings of an orthogonal biplane.

farther forward on a biplane at 23 percent of the chord rather than the 25 percent of a monoplane's.

For an orthogonal combination, the AC is on the vertical line joining the 23 percent of chord of upper and lower wings. See Figure 2.

For staggered combination of equal area, span chord and aspect ratio, the situation is different. For negative stagger, the AC is located midway between the wings on the line joining the 23 percent of chord points. For positive stagger, it is at 57 percent of the distance from lower chord to upper chord measured on the line joining the 23 percent of chord points, as in Figure 4. Where the wing's areas are unequal, the vertical location along the line joining the 23 percent of chord (MAC for tapered wings) is fixed by the following formula:

$$\frac{X}{\text{Gap}} = \frac{\text{Upper wing area} \times P}{\text{Upper wing area} \times P + \text{Lower wing area}}$$

where:

X=distance of the mean chord from the lower chord, and P=a weighting factor of 1 for negative stagger and 1.35 for positive stagger.

CG LOCATION

The CG location for a biplane is no different than that for a monoplane, once the AC has been located. The CG may be ahead of the AC, in line with it or close behind it. Basically, a CG ahead of AC improves longitudinal stability but reduces maneuverability. A CG behind the AC reduces stability but improves maneuverability. A CG in line with the AC is the optimum location. †

Strike Gold!

Made in the U.S.A.



Improve performance with

GOLD SERIES

FOX GLO-PLUGS

Fox Glo-Plugs with 24K-Plated stems allow—

- Better electrical connection • Smoother transition • Better top-end RPM

Order Information: GOLD SERIES—RC long (#41602); Standard long (#41201)

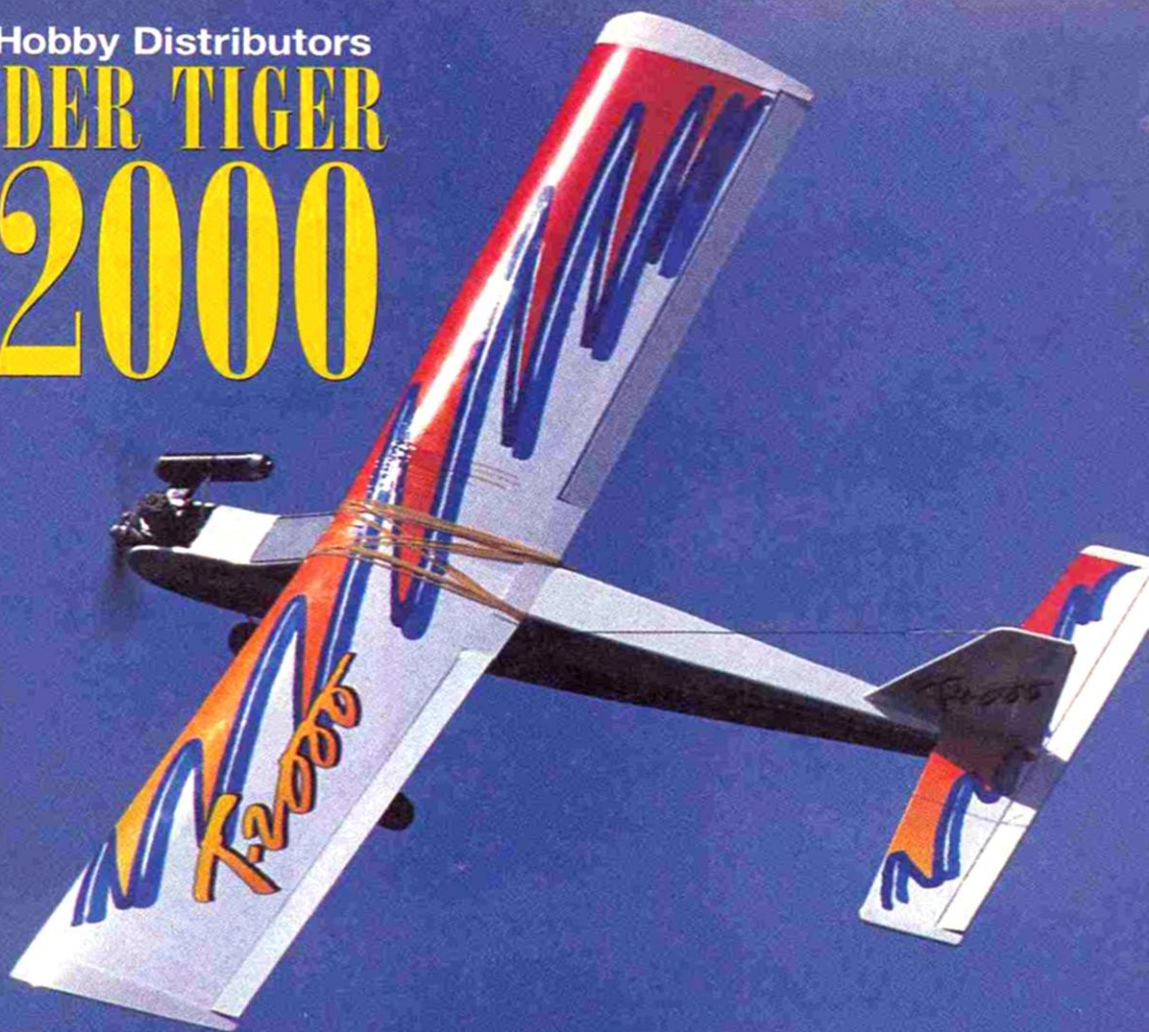
Call us today for a free catalog and learn more about the GOLD SERIES!

FOX MANUFACTURING CO. • FORT SMITH, ARKANSAS 72901
(501) 646-1656 • FAX (501) 646-1757



Quick wings for training

Horizon Hobby Distributors
**THUNDER TIGER
T-2000**



by DEBRA SHARP

WHEN A NEW kit arrives at the *Model Airplane News* office, Larry, Gerry and I like to open the box to take a peek inside. After one look at the Thunder Tiger Trainer 2000, I knew I wanted to review it. Not only was it already dressed in jazzy, printed Mylar covering, but all its control surfaces had already been hinged and glued! No sawing, no cutting, no painting ...; in other words, the perfect trainer for someone who, like me, is forced to use the living-room floor as a workbench.

The kit features an all-balsa fuselage and wing halves and comes with all necessary hardware, including control horns, pushrods, landing and nose gear, fuel tank, wing joiners, spinner, engine mount and wheels. A large, detailed, photo-illustrated instruction manual explains every step, and lists of tools and supplies and field equipment that are needed are very helpful.

And here's the icing on the cake: an instructional videotape, "A Ticket to Fly," produced by Horizon Hobby Distributors*, the exclusive distributor of the Trainer 2000. The tape was advertised to "guide you through the learning process, including tips on assembly, breaking in and tuning your engine and proper radio setup." I couldn't wait to get started.

PUTTING IT ALL TOGETHER

Joining the wing halves is simple: rough up the aluminum dihedral brace with some 80-grit sandpaper and glue the two plywood braces to both sides of it with



Flying the T-2000 is easy; it's the landings I need to work on!

30-minute epoxy. Clamp the layers together with binder clips until the epoxy has cured.

The dihedral brace is supposed to fit into pre-cut slots in the wing panels. In one of my wing halves, the brace was obstructed where a wing rib hadn't been completely cut through. There aren't any hacksaw blades or files to be found in

my living room, so I just wrapped some sandpaper around a pencil and then sanded away. Ten minutes later, the brace fit perfectly, and I epoxied the wing halves together. (Who says you have to have a real workshop with real tools to build a model airplane?!) Assembly continues with the installation of the aileron servo tray and the fuel tank. The instruction manual is complete and very helpful; I was impressed with its detail. I remember the frustrations of having to learn some simple stuff the hard way on my previous projects (like making sure the fuel clunk doesn't touch the back of the tank!). I found only one minor inconsistency in the manual: it tells you to fuelproof the firewall with epoxy after it has told you to install the fuel tank and tubing. (Luckily, I've also learned to read all the manual before assembly, so I didn't have to take everything apart.) The only other advice I can

offer that the manual didn't cover also involves the installation of the fuel tank. I had a difficult time routing the 6-inch pieces of fuel tubing through the small vertical slot in the firewall (it's a tight fit!). It would have helped to route the tubing through the firewall before I had cut it into short pieces, or if the manual had shared a trick like using a needle and thread to "extend" the tubing so you'd easily be able to pull it through that tiny slot in the fuselage.

The rest of the assembly went well, and I needed only a pin vise, a small screwdriver and a hobby knife—no drills, no Moto-tools, no covering irons!



The Webra .40 with the Davis Diesel muffler provided ample power.

SPECIFICATIONS

Model: Trainer 2000

Type: ARF trainer

Manufacturer: Thunder Tiger; distributor Horizon Hobby

Wingspan: 61.5 in.

Wing area: 675 sq. in.

Engine req'd: .40 to .46 2-stroke or .45 to .56 4-stroke

Engine used: Webra .40 2-stroke w/Davis Diesel muffler

No. of channels req'd: 4-channel

List price: \$149.95

Features: all-wood, factory-covered, tricycle-gear model with pre-hinged control surfaces. Comes with a hardware package that includes pushrods, landing and nose gear, spinner, engine mount, wheels, fuel tank and control horns; also included are a photo-illustrated instruction manual and 32-minute "Ticket to Fly" video.

Comments: the Trainer 2000 is an extremely good-looking trainer that's easy to put together. The photos in the instruction manual are large and the steps are detailed. At the field, the T-2000 has forgiving flight characteristics and is very stable. This Thunder Tiger/Horizon model is a winner.

Hits

- Colorful, fuelproof covering.
- "Ticket to Fly" video.
- Factory-hinged control surfaces.
- Detailed, photo-illustrated, instruction manual.

Misses

- Although the instructions were extremely thorough for the most part, a section or two, such as fuel-tank installation, could be improved.

FLIGHT PERFORMANCE

it has been built properly and that the controls move in the right directions. It's better to be safe than sorry!

The Webra .40 that Gerry lent me had been broken in completely, so we didn't have to fiddle with it at the field; after only a few clicks on the needle valve, we were ready to go. With Byron* 10-percent-nitro sport fuel and an APC 10x6 propeller, the Webra .40 had a very reliable idle and a smooth transition to full power. There was nothing left to do but go fly.

• Takeoff and landing

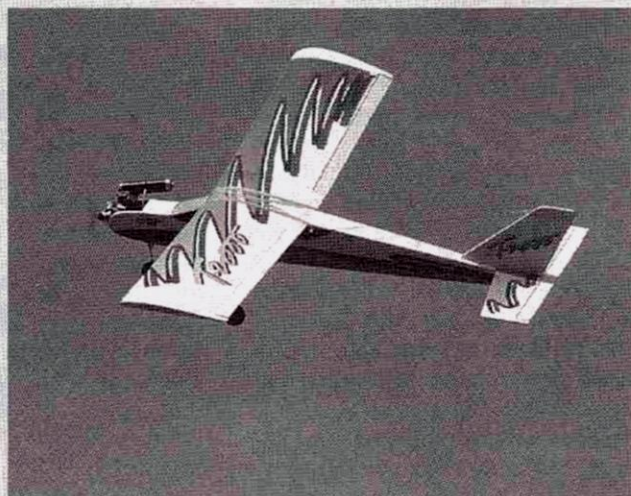
The T-2000 taxis easily, and steering isn't a problem with the tricycle landing-gear setup. With full throttle, the model tracks straight and true and took off in 75 to 100 feet. It requires a small pull on elevator to break ground, and when it's airborne, you should neutralize the elevator to maintain a shallow climb rate. When the model is at altitude, it requires a fair amount of down-elevator trim and a throttle setting of 50 percent to maintain straight and level flight. Almost no aileron trim is required.

Landing is very easy and requires about 1/4 throttle and retrimming the elevator for slow flight. Just hold the nose down to maintain airspeed, and use rudder to control yaw. The T-2000 lands at just above walking speed, and you'll need to push in a little down-elevator to get it to stay on the ground. Rollout is straightforward and undemanding.

• General flight characteristics

At full throttle, the T-2000 is designed to gain altitude quickly. To fly at cruise speed, you'll need 1/2 to 3/4 throttle. Below 1/4

throttle, you'll have to pull a fair amount of up-elevator to maintain slow, straight and level flight. At slower airspeeds, aileron control is diminished, and the model doesn't have any tip-stalling characteristics. A lot of down-trim is required for high-speed flying.



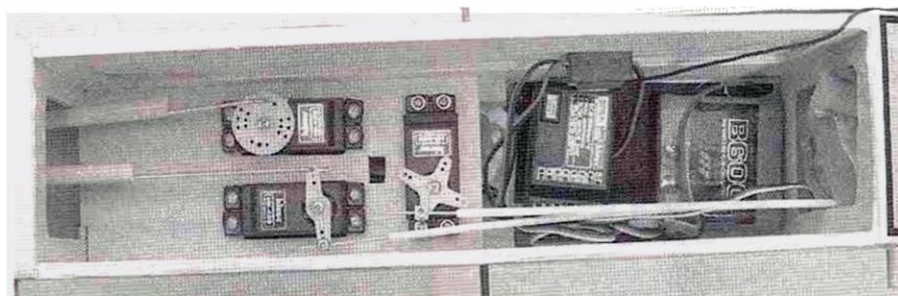
• Aerobatics

More experienced modelers will find that the T-2000 can loop from level flight with anything above 1/2 throttle. Roll response is slow, and you have to add down-elevator while inverted. Set up as a trainer, the model won't spin but enters a slow spiral dive. Inverted flight is possible, but the model constantly tries to right itself and needs a lot of down-elevator. Generally, the T-2000 will give you a lot of think time to get out of trouble.

Installing the landing gear and nose gear is straightforward, although it takes a little work to get the landing gear wires to fit into the groove on the bottom of the fuselage. The horizontal and vertical stabilizers fit precisely, and I needed only to sand the top of the rudder a bit to prevent it from rubbing against the plastic fin tip.

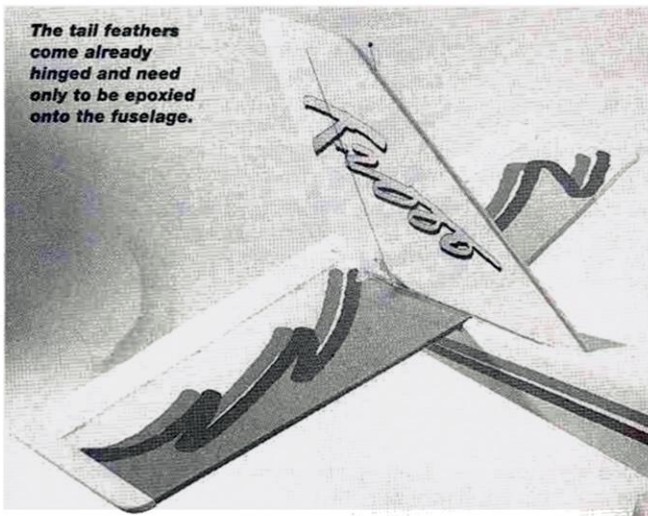
RADIO AND ENGINE

I used a Hitec* Flash 5 radio and four Hitec HS-422 servos in the Trainer 2000. Three



The pre-installed tray in the roomy fuselage made radio installation a snap.

The tail feathers come already hinged and need only to be epoxied onto the fuselage.



servos fit perfectly in the factory-built and installed tray in the fuselage and, again, the instruction manual explained the procedure in detail.

For power, I borrowed a Webra* .40 engine with a Davis Diesel* muffler from Gerry and paired it with an APC* 10x6 propeller. Gerry suggested that I hook the fuel vent to the muffler to add pres-

sure to the fuel tank, and this provided reliable power.

CONCLUSION

This Horizon Hobby/Thunder Tiger collaboration is a winner. The T-2000 is so easy to put together that I honestly can't say I "built" it; the kit needs only final assembly and is a true ARF that you can even build in your living room. The instructions and accompanying photos are clearly written with beginners in mind, and the video is a nice introduction to R/C airplanes. Add to this that the T-2000 is a nice, stable model in the air, and you've got a "ticket to fly."

*Addresses are listed alphabetically in the Index of Manufacturers on page 126.

by CHRIS CHIANELLI

BEAT HIGH-COMPRESSION HEAT

Over the past few years, I have heard of problems with the Chinese-made ASP* engines. I spoke to a few hobby shop owners, many modelers from the clubs in my area and some of the industry's engine gurus, and the response was the same across the board. Some ASP engines tend to run hot, and that makes them difficult to set up. Obviously, this can cause frustrating in-flight engine failures.

Vic Olivett, my "Air Power" associate, spoke to Jimmy Goad Jr. at ISC, which distributes the ASP engines. Jimmy informed us that the ASP engines do not like to run on fuels that contain nitro; for the engine to run properly on any nitro at all, the cylinder head must be removed and a head shim installed to lower the compression ratio. Oddly enough, the ASP .91 instruction

manual states: "A high-quality 2-cycle glow fuel containing either no nitromethane (FAI fuel) or up to 10% nitromethane is recommended. Fuels containing a blend of synthetic and castor oil in the 18-20% range are recommended." Naturally, we were a bit confused by the conflicting information. I defended the instructions' inclusion of up to 10 percent nitro by offering the possibility that the engine might run fine on

low nitro in cool, low-humidity weather. Vic's response was, "Chris, how often are conditions so perfect?"

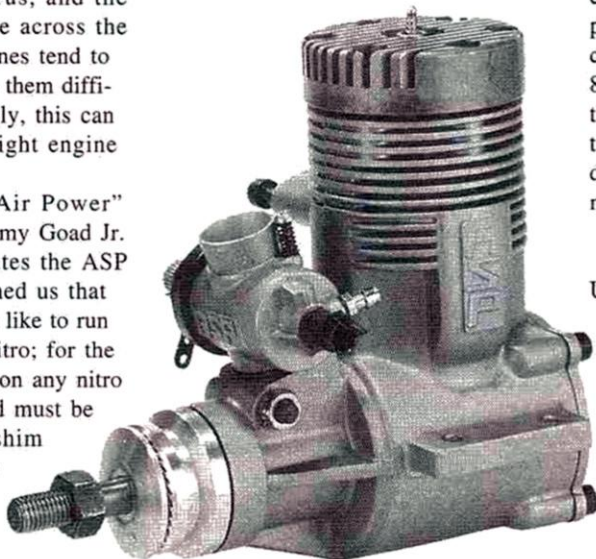
Though they aren't popular here in the USA, engines that run on FAI fuel are quite popular in Europe and other parts of the world. Often, when fuel containing nitro is run through engines set up at higher compression ratios for FAI fuel, problems can occur. This month, we test a simple cure for this situation encountered with an ASP .91.

I spoke with fuel expert Jerry Connelly (Wildcat Fuels*), and he recommended that we try over-the-counter Wildcat 10-percent- and 5-percent-nitro fuel, both of which contain 18 percent lubricant of an 80/20 synthetic/castor blend. After the engine had been well broken in, the research began. (All tests were done with stock expansion-chamber muffler.)

TEST 1

Using the 10-percent-nitro fuel and a Master Aircrow 12x6 Scimitar prop, a high-end reading of 12,100rpm and an idle of 3,000rpm were obtained. The engine, however, ran inconsistently, very hot, and had poor throttle transition; in fact, it quit several times during the test.

(continued on page 75)



Chris, I found your column in the October '97 issue both informative and timely. I'm 56 years old, and after many years of longing to get into R/C, I did it this spring. And I did it in a big way. I purchased a Hangar 9 Cessna trainer and put a Saito FA-56 on it. Next, I bought a Hangar 9 J-3 Cub and a Saito FA-80. I then got the Sig 1/4-scale clipped wing and a Saito FA-91S for it.

For most of the spring and summer, the FA-56 ran very well during my training sessions. The FA-80 ran so rough during break-in that I was worried about using it. My instructor tried to adjust it, but it kept failing when the throttle was more than half open. Finally, it froze up; that is to say the prop required significant force to flip over. So we sent it back. I have not tried to run the FA-91S.

About the time I was having trouble with the 80, the .56 started having trouble. It would just die in the air. It happened that a Horizon rep visited the field on the day I was

having the most trouble, and he asked me which fuel I was using. I told him Byron 4-cycle 15-percent-nitro synthetic/castor blend with 16 percent total oil. He said that was my problem. He said the Saito book warns against using castor oil. Actually, he was only half right. The Saito book warns against using 100-percent castor oil. Even the Horizon rep couldn't give me accurate information.

How the heck is a new flyer supposed to learn this hobby when everyone spouts conflicting misinformation as if he has all the answers?

Now, my hobby shop stick by their recommendation of the Byron fuel for the Saito, but after reading your article, I'm still left wondering. Please tell me which off-the-shelf fuel I should use in the Saito to allow it to run at its best, assuming proper adjustments are made. There are so many 2-cycle know-it-alls in the field who are trying to tell me how to fuel and adjust my 4-cycle Saito that, just once, I'd like to get a straight answer from an experienced, knowledgeable engine guru like you.

FRED SHULTZ, email

(continued on page 74)

4-STROKE FEEDBACK

Fred, if a secondary or tertiary definition of guru is: "Someone who has already made all the mistakes at least twice," then I guess I'm a guru.

Anyway, I think you hit the nail on the head. You aptly pointed out 100 percent castor. Depending on the grade of castor, having solely castor in a fuel can get things gummed up in a season of flying. Still, some Italian engine manufacturers continue to recommend 100 percent castor; go figure.

I agree with your hobby-shop owner on this one. The Byron* fuel with the synthetic/castor mix is not your problem. The fact remains, I have yet to find a rust inhibitor that works as well as having at least some castor (5 to 10 percent) as part of the total oil mix.

Four-strokes are very different from 2-strokes in two very important ways. The first deals with how we protect them against corrosion. Unlike a 2-stroke engine, which breathes through the crankcase, it's impossible to run all the unburned alcohol out of the crankcase of a 4-stroke engine. There's always a little "raw" alcohol left in the crankcase, and the stuff is hydroscopic: it absorbs moisture from the atmosphere. The higher the humidity, the faster the absorption.

During the hot and humid summer of 1986, I ran two O.S. FS .61s the entire season. I ran one on fuel containing some castor and the other on various synthetic-lubricant-only fuels with their "secret" rust-inhibitor additives. In the fall, I disassembled both engines and found that the one I had run on synthetic only was badly corroded with heavy, blotchy stains on the connecting rod and crankshaft web. The one run on the fuel with some castor, however, had a light brown film on the internal parts, and it was wiped off with a single pass of a sheet of tissue paper. Underneath this film coating were parts that looked as fresh and shiny as the day they came off the milling machine. That was all the proof I needed. I've been using fuel with some castor in the mix for my 4-strokes every since and have little corrosion and no operation problems as a result.

The second big difference is the mindset you have to develop when tuning a 4-stroke. You say, "There are so many 2-stroke know-it-alls at my field." There's the problem you're having with your Saito engines; it has nothing to do with the fuel. I see so many guys trying to squeeze too many revs out of a 4-stroke. They end up making the top end way too lean, yet the engine might still idle OK and go to partial throttle just fine. This only serves to confuse the issue for the guy who's new to

4-strokes. The Saito .80 (Gold Knight or standard; by the way, there's no internal difference) is one of my favorite sport 4-stroke engines because of its reliability. I've put this engine in a number of floatplanes where reliability is a definite plus. (I hate rowing!)

You have to lose your 2-stroke "ear" and develop a new one for 4-strokes. When tuned correctly, a 4-stroke will often sound

wrong to the 2-stroke ear. At 7,500 to 8,500rpm—the range in which most 4-strokes do their best work—to the 2-stroke guy, the engine sounds as if it's bogging or is at less than full power. Get a tachometer; it really helps tremendously with 4-stroke tuning. You can rely on the tach while developing your 4-stroke ear. Try this, Fred: bolt on a coarse-pitch prop of an appropriate size (something like a 13x8 or a 12x10 should do the trick) to get your .80 to tach out at about 7,500 to 8,000rpm (static), and wait till you see what happens in the air. With the high-drag planes the .80 is intended for, a 14x6 might be better still. Use these props only if the engine has already been broken in. If the guys at your field are going for that 2-stroke singing sound (the "note" is quite different at 12,000rpm!) with a prop that's too small, they're getting things way too lean and way too hot and still not reaping the benefits a 4-stroke has to offer.

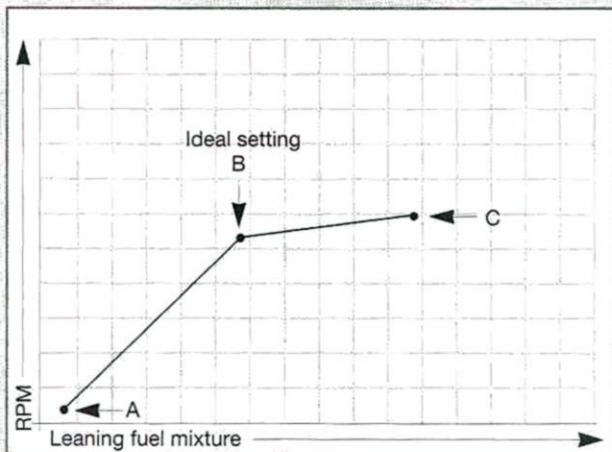
Unlike a 2-stroke, which will often sag when the high

end starts to go lean, a 4-stroke will often—but not always—stop dead at a higher throttle setting (as you say happened at above half throttle) when set too lean. The stop is often so sudden that it can even throw a prop in the process; be careful. Running your .80 too close to the "ragged lean edge" is most likely what caused it to seize up. Four-strokes, particularly the Saito .80, like to run wet. They will puff at idle, and you think they're going to quit when you go to full throttle, but they don't. Leaning out a 4-stroke to the last click yields no power benefit; it just makes it hot.

Also, try an O.S.* "F" plug in your .80. That plug works wonders at smoothing out the idle and throttle response on any 4-stroke; it even improves the top end on certain ones. I still haven't found its equal.

Though I wouldn't recommend a 4-stroke for the rank beginner, when you have a bit of confidence in the flying department, if you understand them and where their power lies, 4-strokes are a fantastic new experience in our hobby. Thanks for the support, Fred. Have fun!

CC



Tuning Visualization

I've found that visualizing this graph helps me tremendously as I tune a 4-stroke. I hope it will help you. Here's how I use this "tool." As you lean the main needle valve on a 4-stroke, there is a direct and immediate response toward higher rpm—to a certain point. This is the line between point "A" and point "B." While this would not conveniently plot as a true linear at a 45-degree angle in the real world, I visualize it as such to make this mental tool more user-friendly. The leaning that occurs between point "B" and point "C" yields very little rpm gain—a few hundred rpm at best—yet heat continues to build. I always try to adjust a broken-in 4-stroke on the B/C "plateau," but as far to the left of the plateau as possible without falling off the edge. This ideal setting is of course at point "B." You'll know you've fallen off the edge if your engine has a sharp rpm drop while you're richening the mixture. Conversely, you'll know you're venturing too far out on the "plateau of increasing heat" if the main needle becomes less responsive and leaning suddenly doesn't yield the same rpm increase as it did just moments before. Go too far out on the "plateau," and your 4-stroke may stop abruptly and throw a prop. Be careful, and always use safety glasses.

TEST 2

The engine was run again, this time using 5-percent nitro. The top end was tached at 11,800rpm with an idle of 2,900rpm. Throttle transition was somewhat better than in Test 1, and idle was fairly steady. The engine still ran too hot, however. As a result, the needle setting had to be periodically readjusted.

TEST 3

Using the same 10-percent fuel as in Test 1, the head shim was added. Again, the .91 ran somewhat better than it had in Test 1, but was still very hot. The high end was tached at 11,790rpm. Inconsistency was still a factor.

TEST 4

With the head shim still in place, the nitro content was reduced to 5 percent. This made a world of difference. Now, a consistent high end of 11,600rpm was realized, and it held steady without needing a needle change after a 6-minute, full-bore run. When the .91 was left to idle for a full 2 minutes (and was tached at a smooth and steady 2,910rpm), it would quickly transition back to high throttle without hesitation. The running temperature was much cooler. I felt as if we had a totally different engine!

With a 13x6 Master Airscrew, high end was 10,700rpm with an idle of 2,680rpm. The static pull with the 13x6 was 10 pounds, 12 ounces.

CONCLUSION

The ASP .91 ran very well on 5-percent nitro with the head shim installed to lower compression. The difference was quite impressive. If you are encountering similar problems with a cranky ASP engine of another size, this simple and very inexpensive fix and some 5-percent-nitro fuel could turn things around for you. For convenience, it would be nice if the factory added the shim to engines intended for the American market. Just a suggestion.

*Addresses are listed alphabetically in the Index of Manufacturers on page 126. *



RCJI & ZAP present FLORIDA JETS '98

Feb.26th thru March 1st at Flagler County Airport, Bunnell Florida

REGISTRATION FORM:

Name: _____ AMA# _____

Address: _____

Tel:(_____) _____ Radio Freqs: _____

☐ \$30.00 Registers one Aircraft ☐ \$40.00 Register multiple Aircraft
(On-site registration is a flat \$60.00)

Payable to: FLORIDA JETS
c/o Frank Tiano Enterprises,
15300 Estancia Lane,
Wellington, FL 33414



Money orders, checks or cash accepted. Sorry, no credit cards.
Maps and itinerary will be mailed upon receipt of registration funds. ✂

HOBBY STAND

- Work on your plane comfortably in any position and any height
- Telescopes from 30 to 60 in. high
- Holds most any size plane with two 6-in. opening Quick Grip bar clamps which adjust to 14, 11 or 9 in. apart
- Material & workmanship guaranteed
- All steel construction
- Powder coated finish
- Lets your glue or epoxy flow to the place needed



- Tilts 180°
- Rotates 360°

- Self standing
- Very stable

- Displays your plane in any position

\$109.95 (plus \$9.95 S&H)
(Iowa res. add 5% tax)

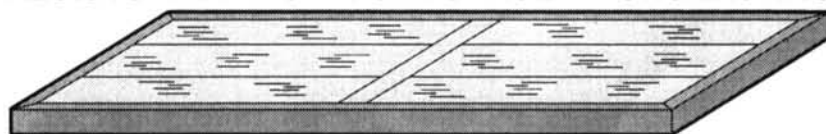


ORR PRODUCTS

100 C STREET • NEW MARKET, IA 51646 • Call toll free 888-588-3359

BALSA WORKBOARD

RESISTS WARPING • BUILDS TRUE • LONG LASTING



2 SIZES AVAILABLE

WB36 36"x14"x1" ... \$20.98 **WB48** 48"x14"x1" ... \$23.98

Add \$5.00 per board for shipping and handling
MA residents add 5% sales tax
Prices subject to change without notice
Allow 3 to 4 weeks delivery



PAUL K. GUILLOW, INC., P.O. Box 229 Wakefield, MA 01880

617-245-5255

fax: 617-245-4738

INTERNET: GUILLOW@AOL.COM



Effective **PROGRAMMING**

by **DON EDBERG**

THINGS UNIQUE TO COMPUTER RADIOS

IN THE LAST few columns, I've shown you some of the features that make computer radios desirable. In this piece, I am going to begin describing features that may *only* be found on computer radios ... and why you might need them. What's covered in this column is shown briefly in the table. There's so much to be covered, however, that it is going to take several columns to do it right.

Computer radios have memory, just as every other computer does. These days, the memory may be used to store built-in functions, or it can be utilized for multiple model memories—or both. Depending on your budget is the more you spend, the more built-in functions and model memories you'll have.

Model memories are really handy when you regularly fly more than a couple of models. Each model memory keeps track of all the settings for a particular model—things like trim posi-

tions, neutral settings, servo-travel settings, dual-rate and/or exponential settings and on/off switches, special mixing functions, the model's name and more. Instead of using multiple "regular" (non-computer) transmitters, one for each model—or having to switch trims and such on a single transmitter—in a computer radio, you can store each model in its own memory. In this way, you can use a single transmitter for two or more planes/helicopters/gliders and save some bucks by not having to buy a whole second R/C system, which may come with the wrong type, quantity, or size of servos, or wrong battery-pack capacity. Once you own one computer radio, you can just buy a receiver, flight pack, or servos from your radio's manufacturer or from a third-party vendor such as DAD, FMA Direct, Hitec, etc. You can buy servos from *any* manufacturer, but you'll have to change the connector to match your system.

Economical radios such as the Airtronics Radiant, Futaba 6X, JR XP-642 and Hitec Flash have two, three, or four memories. The Futaba 8U and JR 8103 both have eight, while the top-of-the-line Futaba 9Z and JR 10SX have 10 memories apiece (although the 9Z can accommodate an optional CamPAC, which holds as many as six more models). Another notable exception is the Airtronics Stylus, which holds only four internal model memories but can have an optional storage card holding 50 (!) models.

Please note that in all of the combination radios (systems with built-in airplane and heli and sailplane programs), you can mix model types. For example, you might have five different aircraft, two choppers and a sailplane stored in your 8U or 8103. But beware! A high price does not necessarily mean you'll get multiple programs in a radio. The JR PCM-10SX comes in separate acro and heli versions, meaning if you want to fly both types of aircraft, you'll have to buy two transmitters.

Sometimes, modelers find programmable systems difficult to program (I should know; I sell the "Guide to Computer RC Systems" book for just this purpose!). Some radios allow you either to transfer programs between transmitters or to store your programs on memory modules or cards so that they may be easily transferred between like transmitters. I recently loaded three different model setups onto a CamPAC memory module and mailed it to a friend in Chicago (the CamPAC is made for 8U and 9Z transmitters). The Stylus will do the same thing on its memory card. Had my friend been nearby, I could have transferred the information directly to his transmitter if they were connected by a buddy-box trainer cable.

Speaking of training functions, it's often possible to connect two computer radios together for training operations so that the instructor pilot can control whether or not the student pilot is sending commands. However, the instructor can often choose *which* controls the student can activate—not necessarily all of them. For example, the instructor could select only elevator and aileron commands to be accessible to the student pilot; this could be less confusing in the initial

COMPUTER RADIO FUNCTIONS DISCUSSED—THEIR USES

Computer Radio Feature	Use for ...
Memory	<ul style="list-style-type: none"> • Programming features. • Model memories.
Model memories	<ul style="list-style-type: none"> • Storage of neutrals, trims, servo travel, dual rates and/or exponential settings and on/off switches, special mixing functions, model's name, flight timer, etc. • Allows one transmitter to be used with multiple memories.
Plug-in memory or buddy-box cords (on certain systems only; see main article)	<ul style="list-style-type: none"> • Used to add model memory capacity. • Handy to transfer model settings from one transmitter to another, saving programming time.
Training functions	<ul style="list-style-type: none"> • Instructor can restrict trainee's access to channels, helping him to concentrate on primary functions without being distracted by others.
Trim memory	<ul style="list-style-type: none"> • Stores model's trims so that when different model memories are called up, trims are where they were last time.
Electronic trims (only on certain systems)	<ul style="list-style-type: none"> • Only function when radio is on, so no more accidental trim changes. Settings stored automatically.
Throttle cut	<ul style="list-style-type: none"> • On systems with electronic trims, allows you to kill engine without losing idle trim position.
Idle down	<ul style="list-style-type: none"> • On systems with electronic trims, allows you to set lower in-flight idle speed.
Timers, stopwatches	<ul style="list-style-type: none"> • When provided, keep track of elapsed time and user-selected times such as flight duration.

pilot training period. Later, the throttle and/or rudder could be activated when the student is ready. On helicopters, the student could concentrate on cyclic while the instructor controls collective and rudder. You get the idea, right?

Many computer radios have the ability to store the current model's trim tab positions—a function often called "trim memory." This function is really nice because if you use it, you can neutralize or center your trim tabs, and the radio keeps track of where they used to be! This is particularly nice when you switch from one model memory to another. With the trims centered, you don't have to worry about changes to trim settings, as the trims are already where they were when you last flew the model.

Now is a good time to discuss electronic trims. Electronic trims really are pilot-activated switches that command the radio to offset the servo-neutral positions, as opposed to conventional mechanical trims where one physically moves the trim tabs. Currently, electronic trim tabs are offered on Futaba's 8U and

9Z and Hitec's Flash 4 and 5.

You may never think twice about trim tabs until you, or someone in the transmitter impound, moves the trims accidentally. Unless you carefully inspect your transmitter before each flight, you'll discover that the trims have been "adjusted" the next time you fly when you notice that the plane isn't flying quite the way it used to, and you'll have to re-trim. Re-trimming usually isn't a big deal, but forgetting to set the proper trims could occasionally cause a crash or at least erratic flight until fixed.

This type of problem never occurs with electronic trims, which cannot be changed unless the radio is turned on! The current settings are automatically stored in the model settings memory when you turn off; this means that whenever you load a model setup into the active memory, the last set of neutrals is also loaded. No more worrying about trim positions!

With electronic trims on throttle, a "throttle-cut" function is provided so that you can kill the engine by flipping

a switch, instead of changing your trim position ... which was probably set to a good idle. With the kill switch, you don't lose your engine's idle trim every time you kill the engine. You may also find an "idle-down" function that is used for models that demand idle speeds lower than those used on the ground for landing; this is common on many pattern models.

Some folks have trouble accepting electronic trims, saying they need instantaneous, full trim travel, especially when making adjustments during initial flight testing. You need to understand that it's possible to adjust the rate of travel of the neutral position so that it's very coarse: each blip of the trim switch results in a large trim change so that you can accommodate models that are quite out of trim.

I have come to prefer electronic trims since they are always in the last position that I left them, and I also like the "beep" sound I get each time I hit the switch; in fact, with the trim in the fine-motion mode, one can make very fine adjustments in trim. So far, after five

BEE A HERO! Be a Role Model!



PRICE LIST

We accept credit card & C.O.D. orders by phone. If you're in a hurry, let us know. We'll ship your order the same day. You can also mail us your order, checks & money orders are accepted. You must see the amazing things you can do with a Bee - for \$10 we will priority mail you our one-hour video and catalog.

40" LAZY BEE KIT - \$59
48" LAZY BEE KIT - \$65
(Great for beginners!)
40" LAZY BEE SPECIAL - \$69
50" LAZY BEE SPECIAL - \$79
40" SPEEDY BEE KIT - \$79
TREXLER 3-WHEEL SET - \$15
(for all above kits)
FLOAT KITS (for all above) - \$24

LAZY BEE ELECTRIC COMBO - \$99
(call for details and upgrade info.)
60" BIG LAZY BEE - \$109
72" BIG LAZY BEE - \$119
BIG BEE 3-WHEEL SET - \$19
BIG BEE HEAVY DUTY WHEELS - \$32
TREXLER WHEEL PUMP - \$8
NEW! BIG LAZY BEE FLOATS - \$45
EASYTEX COVERING - \$12.75 per Roll

Clancy Aviation

P.O. Box 4125

Mesa • AZ 85211-4125

Tel: (602) 649-1534

Pledge to teach a kid to fly and get 15% off on any **Clancy Kits** you buy. Beginners love the **Lazy Bee** because it's so easy to fly. Even though the **Lazy Bee** is a great trainer, expert pilots fall in love with its up-close-and-personal style of aerobatics. We hope you will take advantage of the **Lazy Bee's** stunning looks and ability to fly anywhere to entice newcomers to join us in this great hobby. It teaches science, craftsmanship, self-discipline, and even history - so sorely needed by America's kids. And, **IT'S GOOD CLEAN FUN!**

LITESPAN COVERING - \$6 per Sheet
BALSALOC ADHESIVE - \$4 per Jar
NEW! FOR SMALL PLANES FROM
WES-TECHNIK IN GERMANY:

3.5 GRAM SERVOS - \$80 ea.
SPEED CONTROL w/BEC - \$70
(1.9 gram, 5 Amp)

ALL KIT PRICES INCLUDE
SHIPPING INSIDE THE U.S.

years' use of my 9Z and 8U systems, I have had zero difficulty using electronic trims and heartily recommend them.

Many computer radios provide timing functions. On the less expensive radios, this is usually an elapsed-time counter that can be used to keep track of how much flying has been done on the current battery charge (they can be reset when desired). Other systems provide added timing functions that may be used as stopwatches. Many of these timers may be set to count up or down. Up-counting is useful for folks like sailplaners who wish to know how long they've been flying, while down-counting is handy for powered models. On my helicopter, I wanted to know when I should quit flying before the fuel became low, so I set a timer to last for 10 minutes. Later, I modified the timer so that it would run only when the throttle stick was above its 1/3 position, which is where the gas starts getting consumed faster. This sort of "stick logic" ("on" if the stick is past a certain location; "off" if it isn't past) is available on the fancier systems.

Perhaps the epitome of timers is contained in the Futaba 9Z. It's an automatic-shutoff feature that keeps track of how long the transmitter has been on. If it doesn't sense any control inputs for 10 minutes, it will automatically shut off the transmitter!

Next time, we'll cover more computer radio features such as flight conditions, mixer functions, control curves and servo position indication.

FEEDBACK ON PCM VS. PWM

I got some email commenting on what I said about PCM/fail-safe vs. PWM ("FM") in my last column. Most of it was supportive and thanked me for my comments. However, a couple of writers took me to task, saying I didn't provide any backup data, etc. Well, I don't really have any data, and this discussion tends to be a never-ending one in which the two sides can never agree. Put succinctly: some folks prefer PCM and others don't. Use what works best for you. But if you want to save a few bucks, you can live without it.

WHAT HAS WHAT?

If you're wondering which radio has which of the functions mentioned above (and many more not mentioned that will be covered in future columns), the "Computer Radio Chart" compares 21 models of radios in the U.S. in over 60 categories and is available for \$5 postpaid (U.S. \$6 overseas airmail) from Dynamic Modelling, 4922-2J Rochelle Ave, Irvine, CA 92604-2941; call toll-free (888) 770-1812; (714) 552-1812; email: <dynamic3@flash.net>. "The Guide to Computer Radio Control Systems" book is available in the U.S. for \$20 first-class postpaid (foreign airmail, U.S. \$29) from the same address. If you buy the book, the chart is only \$3, a \$2 savings.

Remember, if you want to write me personally, send your self-addressed, stamped envelope to Don Edberg, 4922-M Rochelle Ave, Irvine, CA 92604, or you can email me at <dynamic3@flash.net>. I get lots of mail, so be patient!



The covering iron that makes all others obsolete

This sealing iron eliminates guesswork! All major iron-on covering manufacturers recommend specific application and shrinking temperatures to achieve the tightest and longest-lasting possible finish.

Only the **21st Century Iron** has a built-in temperature control system accurate to within three degrees Fahrenheit of the dial setting! Simply set the dial to the

desired temperature. The Temperature Processing Indicator (TPI) lights as the iron temperature rises to reach the dial setting. The TPI blinks when the set temperature is reached, telling you it's time to cover! No thermometer or complicated testing needed — this advanced tool is the only iron which allows you to dial a specific temperature.

The **21st Century Iron** has been designed from the ground up by master modelers. Its unique shoe design will reach into places other irons can only dream of, and its fully contoured shape

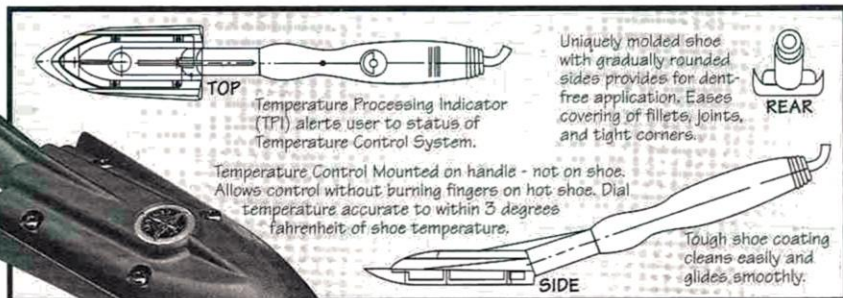
allows for dent-free application. The temperature control dial is on the handle, not on the hot shoe — *no more burned fingers!* Its specially formulated coating delivers remarkable slip characteristics for the smoothest, no-drag slide over virtually any covering surface. A custom-fitted covering sock and a sturdy table-top stand are included free. It costs a little more than conventional irons, but it's the last iron you'll ever buy. *The "smart" iron — only from Coverite.*

For the location of the Coverite dealer nearest you, please call **1-800-682-8948**, and mention code **#0213L**.



COVERITE™

Distributed Exclusively Through
GREAT PLANES MODEL DISTRIBUTORS COMPANY
P.O. Box 9021, Champaign, IL 61826-9021



© Copyright 1996—3139002



R/C CYBERNEWS

by JIM RYAN

POINT-AND-CLICK DRAWING

We've spent the last two columns looking at ways of importing a paper 3-view into a CAD environment as a starting point for designing a scale model. The first method used a scanned image, while the second entailed direct measurement of the paper 3-view. Both have their strengths and weaknesses. This time, we'll complete this series with a look at a specialized peripheral, which is extremely useful if you spend a lot of time designing. Which of these three methods you end up using will depend mainly on your personal tastes and available equipment.

DIGITIZER TABLETS

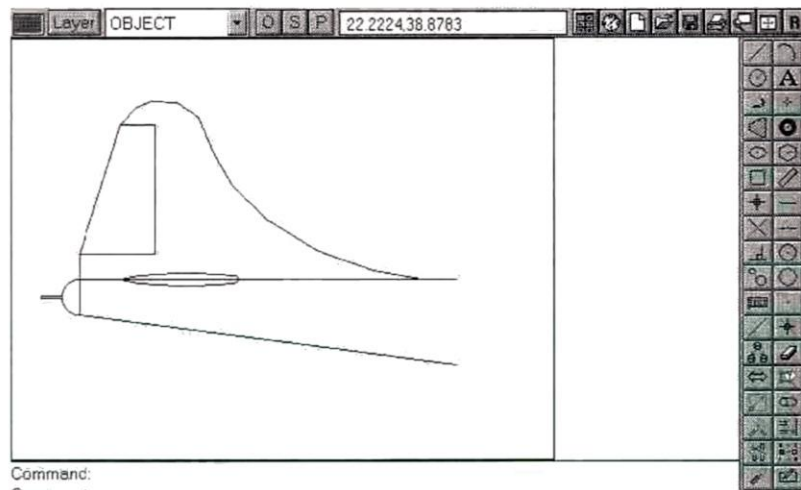
If you do a lot of CAD work, one of the handiest items you can own is a digitizer tablet. Tablets are devices that fulfill the functions of the mouse and onscreen menus and also provide single-button shortcuts to commonly used commands. The better CAD programs come with an overlay template that can be attached to the

tablet's surface. You then go through a brief calibrating procedure so that the computer will know what you're pointing at when

you click a button on the keypad of the digitizer "puck." You can also assign commonly used commands to the various keys on the puck so you no longer have to type commands such as "endpoint," "midpoint," "intersection," etc., or select them from the onscreen menu. This seem-

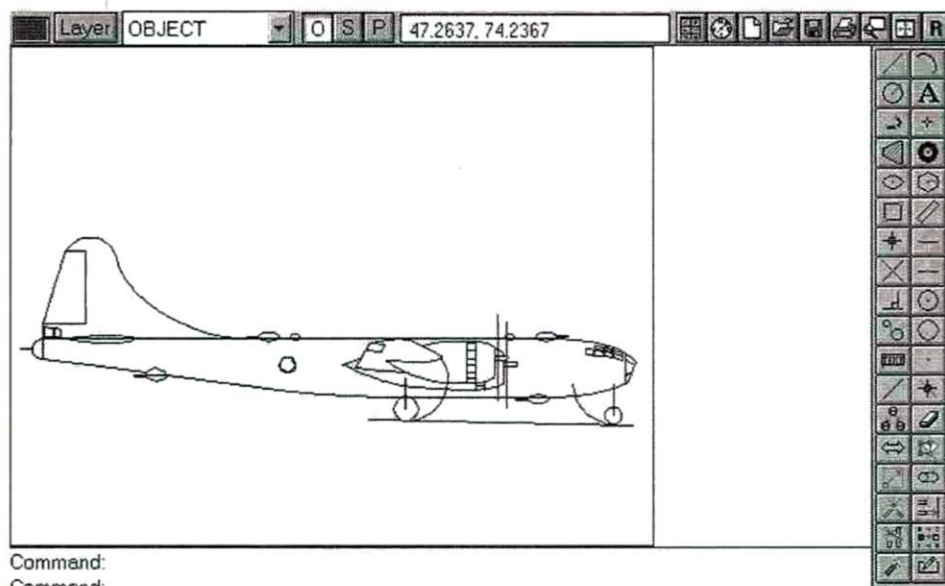
ingly minor improvement can really speed things up.

But for the purposes of the present discussion, the *real* beauty of digitizer tablets is that they make it easy to transpose the key data points on the paper 3-view into your CAD program. Once you have the tablet connected to your computer, and your CAD program is up and running, you should first attach a test sheet with a square drawn on it to the tablet's surface (mine has a clear overlay to slip the sheet under). Transpose the square to your CAD screen by putting the crosshairs of the puck



Command:
Command:

Once the tablet is calibrated, transposing the 3-view is a simple matter of clicking data points at regular intervals. Click more points where the outline is sharply contoured.



Command:
Command:

Finish the view by editing the jagged polyline into a smooth contour with the "spline" or "fit" commands. You're now ready to scale the 3-view and begin designing the internal structure.

over each corner of the square and clicking an endpoint for a line. Check to see that the square you've drawn on your screen matches the original. Usually, you'll have to adjust the tablet's scale and X-Y proportions by running through the calibration procedure. Once this is done, the square on the screen should be the exact size and proportions as the original. Now you're ready to go to work on your 3-view.

POINT-AND-CLICK DRAWING

As was done with the direct measurement method I outlined in the last column, draw a datum line on the side and top views of your paper 3-view. Again, I like to start with the top view, and I treat the fuselage, wing and stab as three distinct entities. Enter a "line" or "polyline" command and follow the outline of

the fuse on the top view, centering the crosshair of the puck on the outline and clicking to designate an endpoint at regular intervals. The more endpoints you designate, the more accurate your 3-view will be. It's helpful to use more station points where the fuse is sharply contoured and fewer where it isn't. As you progress around the 3-view, you'll see a somewhat jagged copy of the outline appearing on your computer monitor. Once the polyline has been completed, use the "spline" or "fit" commands to edit it into a smooth contour. Follow the same process for the wing and stab and any other important features; then use the "mirror" command to produce the other half of the top view.

Use the same process to make the side view. I make the outline for the top and bottom contours as two separate polylines, which makes them easier to modify. As you can see, things go very quickly because you don't need to stop and measure every data point; you just click points at regular intervals, and the tablet and computer do the rest.

After making frameworks for the height and width, you can follow the same process to draw the former sections. Again, just draw half of each former and then use the "mirror" command to make the other half. If you're reasonably conversant with CAD, you should be able to complete a 3-view in an hour or so.

SCALING TO SIZE

As we discussed last time, once you have the 3-view completed, print out a 1:1 copy and match it up to your paper 3-view. The two should match perfectly, but if they don't, minor errors can be easily corrected at this stage. If you're happy with the outline, use the "scale" command to scale the 3-view to your working size. Check the areas and moments to make sure they suit your requirements before proceeding further. Once you're happy with the size, you're ready to proceed with drawing the internal structure of the airframe, and we'll talk about that process next time.

PERFORMANCE PREDICTION: WILL IT FLY?

Electric-powered models have made tremendous strides in recent years. No

ElectriCalc and MotoCalc are two of the best of a growing crop of programs designed to model the performance of electric-powered aircraft. Both have simple and easy-to-understand user interfaces, and data can be imported and exported in seconds.

longer limited to motorized sailplanes, today's electric aircraft include giant-scale warbirds, ducted-fan jets and pylon racers. And the electric sailplanes are now capable of flying nearly straight up and reaching 1,200 feet or more on a 30-second motor run. The most noticeable hardware advances have been in electronic speed control, motor and Ni-Cd technology, but perhaps the most important strides have been made in the knowledge base. That's right; having the best components is less important

than putting them together in a well-matched system. A few pioneers have known this for years, and this is why they were successfully flying aerobatic scale models when others were just trying to drag a motor glider up to thermalling altitude.

The lesson that was learned was that all components must fit together in a matched system for the aircraft to have the desired performance. The best Ni-Cds, the most efficient speed control and the most powerful motor are of little use if you select the wrong

prop or gear ratio. In the past, answering these questions required careful bench and flight testing to identify the best combination. Fortunately, the personal computer and some creative software developers have come to the rescue to provide software that provides accurate forecasts of performance for any given model, including those that are only a gleam in the designer's eye. Rather than spending endless hours and hundreds of dollars testing various combinations of props, gearboxes and cells, the modeler can spend a few minutes at the keyboard and generate several workable solutions. From these, he can make a final choice based on the hardware that he already owns or wants to acquire.

Two of the best performance prediction applications that I've seen are *ElectriCalc*, by SLK Electronics (<http://www.SLKElectronics.com>), and *MotoCalc*, by Capable Computing Inc. (<http://www.capable.on.ca/>). Both are available for download from their

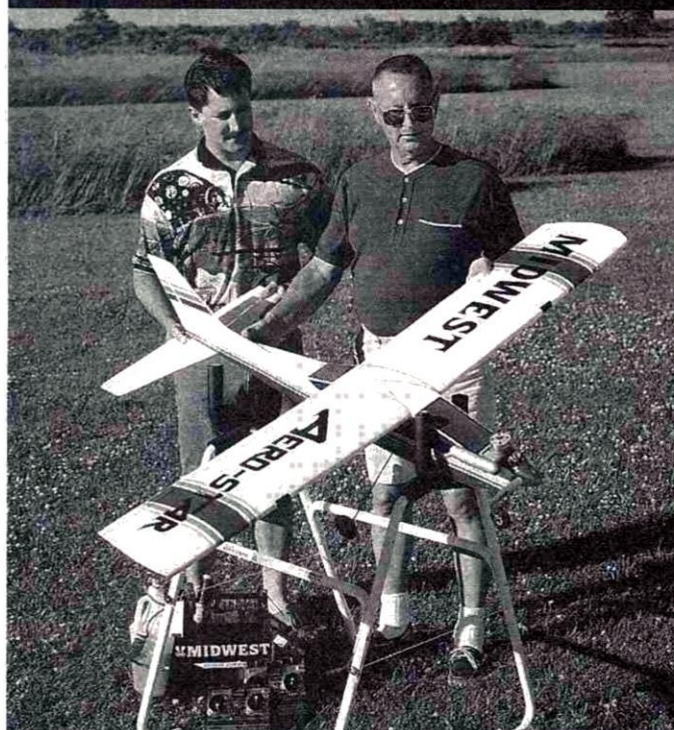
websites or through electric flight suppliers. In operation, you select the number and type of cells, along with the motor, prop and gearbox (if applicable). There are also fields for specifying the size, weight and wing area of the airframe. The program then outputs accurate predictions of the current, watts, top speed, maximum rate of climb and endurance for that system. The values can be fine-tuned for any throttle setting you select.

The greatest strength of these two particular applications is that they allow you to check a number of power systems options in a very short time. Rather than having to step through a menu, you can change a single data field, and all the other variables will be updated automatically. Want to see what will happen to your current and top speed if you go from a 7-cell pack to a 9-cell pack? Want to know if a deeper-pitched prop will improve your rate of climb? The answers are there in seconds. Both programs feature

simple and easy-to-understand interfaces, and their databases can be updated to reflect the latest hardware. I recommend you go through the features tour on both websites and decide which you like best, but it would be hard to go wrong with either one. After spending some time with these excellent programs, I think you'll agree that information is the most powerful tool in the electric flyer's arsenal.

In addition to your questions and suggestions, I'd like to hear what you think of the column so far. Is the content useful to you? Are there other computer-related subjects you'd like to see addressed? Tell me what you think! My address is 6941 Rob Vern Dr., Cincinnati, OH 45239; phone (513) 729-3323; fax (513) 729-3432. I'm easiest to reach via email at jimryan@sprintmail.com. Please include an SASE with all written correspondence (except email, of course)! ✈

Build It Better! Build It Yourself!



A Legendary Trainer

The MIDWEST AERO-STAR .40 has become a legendary trainer because it works so well, well enough to train thousands of R/C pilots over the last 15 years. No ARF trainer available today can boast such a long period of success. We truly believe that when YOU build your own trainer kit, YOU will understand more about what the sport of radio control airplanes offers!

The MIDWEST AERO-STAR .40 features our exclusive 104 page Success Series Construction Manual that is truly a "handbook" on R/C building and flying. This manual contains over 250 step-by-step illustrated instructions. Micro-Cut Quality wood parts are 90% pre-cut. Self-aligning construction makes building quick and easy. And when it comes to flying - the MIDWEST AERO-STAR .40 self-recovers to a normal glide by simply closing the throttle and letting go of the sticks. When you build and fly the MIDWEST AERO-STAR .40, you'll acquire skills that will last a lifetime, and enable you to progress to more difficult models.

Your successful modeling experience begins with the MIDWEST AERO-STAR .40. Built it today!

Midwest Aero-Star .40 - Kit #159

Wingspan: 62" Wing Area: 675 sq. in. Flying Weight: 5 - 5 1/2 lbs.
Channels: 4 Engine: 2-Stroke - .32 - .45, 4-Stroke - .40 - .56



MIDWEST
PRODUCTS CO., INC.

P.O. Box 564 Hobart, IN 46342
(800) 348-3497
E-MAIL: kits@midwestproducts.com



3-View Documentation for Scale Modelers

NOTE:
MODEL "501" AS SHOWN!
MODEL "501" WAS FITTED
WITH ONE 20MM CANNON
FIRING THROUGH REARVIEW
BOSS, AND MOUNTED
MACHINE GUNS ONLY.

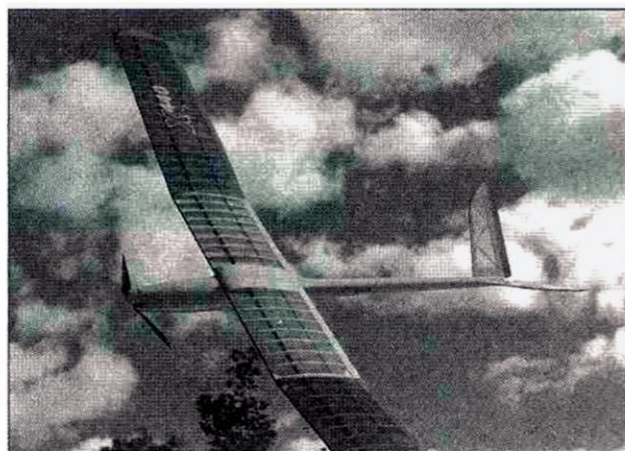
COLOR SCHEME:
PAINT IN AERIAL
DARK FINISH
• RED
• BLUE
YELLOW "2" ON FIN
OBTAINED WITH BLACK
BLUE SHADOW ON
FUSELAGE FINE WHITE
CHIPS

Labels and Assembly Instructions:
PILOT
TUBE
GUN SERVICE
DOOR
RILLERON
RILLERON
HORN
WING RESIST
SHUTTERS
MACHINE
GUNS
OLEO-PNEUMATIC
SUSPENSION
JETTABLE
WING GAS TANK
RADIO ANTENNA
STEP
GAS TANK
VENT
GAS TANK
FILLER CAP
NON-SYNCHRONISED
MACHINE GUN
RADIATOR
STOP
RADIO ANTENNA
YELLOW
D.501
No 79
A
B
C
D
E
F
0'
5'
10'
15'

The 500/501s were powered by 12-cylinder Hispano-Suiza engines rated at 690hp at 4000m (13,125ft). Armament consisted of either two 7.7mm Vickers or 7.5mm Darn guns in the fuselage, with provision for two similar wing-mounted weapons. It was considered a frontline fighter in the mid-'30s, but the Dewoitine 501 was relegated to training duties shortly after the outbreak of WW II.

Range: 540 miles
Top speed: 288mph (at 16,405 ft.)

SR X440



Well, it's been about a year since we introduced our X440 electric sailplane. And, boy it's been some year! To all of you who had to wait for an X440 we have to apologize. Our production just couldn't keep up with the demand no matter how hard we tried.

We know the wait was worth it because so many of you have written to tell us how much you liked your new X440. Mike McG. wrote, "The X440 you sent me has been a pure joy! While the climb out is no where as dramatic as my Class A/B sailplanes, its low wing loading and thermal capability more than make up the difference!" Mike bought the *Standard Power System* for his X440 so his climb rate was more gentle.

Jerry H. wrote, "The quality of the model is simply amazing. I just cannot get over how nice it is. The covering job is unbelievable. The instructions are also top notch."

Here's what Chris M. had to say, "Just wanted to say how pleased I was with the X440 that you sent to Winnipeg for me this summer. I put it together on my brother-in-law's dining room table on the Sunday afternoon after I got there and went out flying the next morning. Everything worked just as it should. What a treat.

My first flight was 35 minutes with the help of a couple of thermals.. It exceeded my expectations in every way!"

Just in case you're not familiar with the X440, it's a *Custom Built* electric sailplane. It will take you about 2 hours from the time you open the box until you head for the field.

Sure there are other Ready-To-Fly and ARF kits but for the most part they are lead sled plastic bags and they still take a bunch of hours to get flying. The X440 is made up of CNC computer cut balsa and carbon fiber parts and a fiberglass fuselage. The X440 only weighs 10 ounces and once you've installed the radio system and power system the total weight is about 22 ounces for a wing loading of only 7.5 ounces per square foot! It has a 64.5" wing span and a wing area of 440 square inches. The aspect ratio is 9.4:1 and the airfoil is the S3021.

Power for the X440 is either a simple geared Speed 400, AP29BB, or Astro 020 Brushless motor powered by 7 of our 500 Max Series cells. As you can see from the chart below, The *Standard Power System*, which uses a Speed 400 6V motor, will give you 5 climbs to altitude from a single charge. It doesn't get much better than that!

As I've said, this is a *Custom Built* kit. By that I mean that everything is pre-built and all you have to do is mount the motor with two screws, mount the servos, and hinge and connect the control surfaces. That's it! It's as if the world's best builder custom built the X440 for you. Frankly, you've never seen an aircraft which has been built and covered as well as the X440!

Because the parts are CNC machined, they are all identical. This not only means that the parts fit right but it also means that we can stock spare

parts so that if the unthinkable should happen, we can get you back in the air in a hurry.

How does the X440 fly? As good as you could want with absolutely no bad habits. You can thermal or motor around to your heart's delight. Even with its outstanding performance, it's an easy airplane to fly and would be the ideal aircraft to use to introduce a newcomer to our Hobby. The price? Only \$229.95 plus shipping but if you buy an X440 along with a *Power System* at the same time, we take \$20 off of the price of the X440.

Here's an important point. To provide you with the utmost in performance and the fastest building time, we've designed complete radio and propulsion packages for the X440. We've thought out all of the details ahead of time so you won't have to waste time making all the decisions usually associated with building a new aircraft. Call us if you have any questions or to place an order. You can reach us at SR Batteries, Inc., Box 287, Bellport, New York 11713. Our phone is 516-286-0079 and our fax is 516-286-0901. Our Email address is 74167.751@compuserve.com .

If you'd like to be flying one of the world's finest electric aircraft, give us a call and we'll get one ready for you.

-ADVERTISEMENT-

Power System	Motor	# Cells	Total Wt.	Amps	Climbs/Charge	Wing Loading	Climb Rate	Flight Duration
Standard-7	Speed 400 6V	7	22oz.	9.5 A	5	7.2oz	650	36 min
Standard-8	Speed 400 6V	8	23	11.5	4	7.5	860	37.5 min
Performance-7	AP29BB	7	24	16.7	2.5	7.8	1150	33.2
Performance-8	AP29BB	8	24.5	20.00	2	8	1500	35.2



Scale **TECHNIQUES**

by **GEORGE LEU**

NEW AND CLASSIC KITS

SINCE I STARTED IN THE R/C hobby, the glow engine has been the primary source of power for my aircraft. I have had much experience with the .40- to .90-size engines in my sport, scale, pattern and ducted fan, jet aircraft. While I believe I have a certain amount of success working with mechanical devices, I can't say this for all the glow engines I've owned. Some engines have performed flawlessly straight out of the box, while others have been anything but reliable. For me, true success with the glow engine remains a mystery, especially with large glow engines.

Having been teased mercilessly by my friends about using glow engines in my giant warbirds, I finally decided to try a gasoline-powered engine. I have to tell you that I can see no immediate faults with them. The

ignition systems don't affect our newer radio systems, and the larger diameter, but slower turning, props produce gobs of power. Oh yeah, did I tell you that gasoline costs a tenth of what glow fuel does? No wonder my buddies kidded me so much—I did not know what I was missing.

The point I'm trying to make is, if

that are definitely "user-friendly"—the newest being the Dynaflyte* Super Cub. This new kit is of conventional construction and builds into a nice, big 104-inch span IMAA legal model. The PA 18 Piper Super Cub can be seen quite often at local airports and documenting one shouldn't be too difficult. The kit comes with an illustrated, 35-page instruction manual, a vacuum-formed windshield and engine cowl, bent wire for

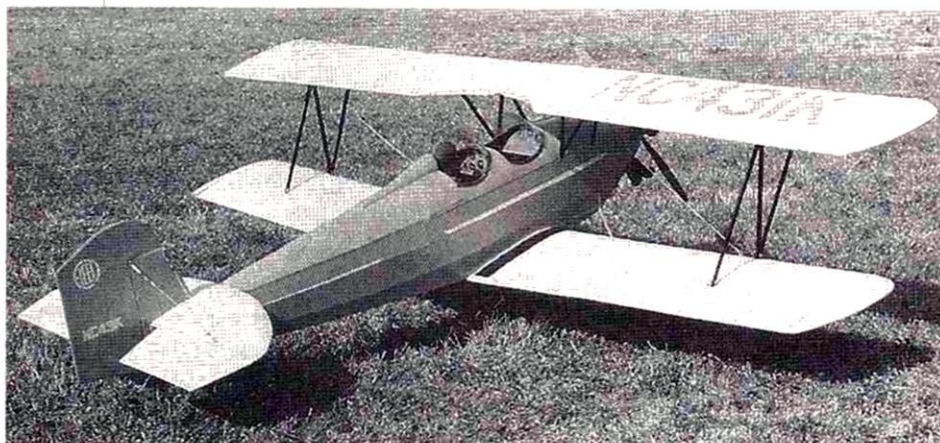


The new Dynaflyte Super Cub is an excellent civilian scale subject. Documentation is up the road at the local airport.

you haven't yet tried gasoline engines to power your models, you should try them at least once. I bet you'll appreciate the decrease in engine tinkering. After all, when we

the landing gear, and the model has a plug-in wing design. The plans also show details for flaps. And talk about a perfect model for a gas engine! The PA 18 can use the US Engines* 25cc gas engine for power; it is drawn right on the plans. I've always liked the wider pressure cowl and its effect on the appearance of the Super Cub. I hope to have one of these models, too. So many planes—so little time.

The second model I want to mention has been around for a while now, but it's still a great choice. It is the 83-inch wingspan Concept* Fleet Biplane. I'm currently flying one that's powered by a Quadra* 42, and I love the way it flies. There's nothing nicer than watching a big old biplane perform stall turns and wingovers to make you feel good. I'm using an 18x10 prop with good results but will soon put a 20x6 prop on it to see what happens. The Concept Fleet also uses traditional balsa-and-plywood construction, and there is nothing fancy about building one. The parts fit is good and, overall, the kit is very complete and well worth the money—especially after that first successful flight.



A classic choice for a civilian aircraft model is the Concept Fleet Biplane. At 83 inches in span, the model is ideally suited for a Quadra 42 gas engine.

only drawback right now is myself. I'm an experienced modeler with a new power system that I know very little about. I'm still experimenting, but I can tell you this much: I like gas engines a lot. Gas engines are very user-friendly; once the needle valves are set, you might never touch them again all year. The magneto

go to the flying field, we should be flying and not fiddling around with a balky engine in the pits.

CIVIL AVIATION

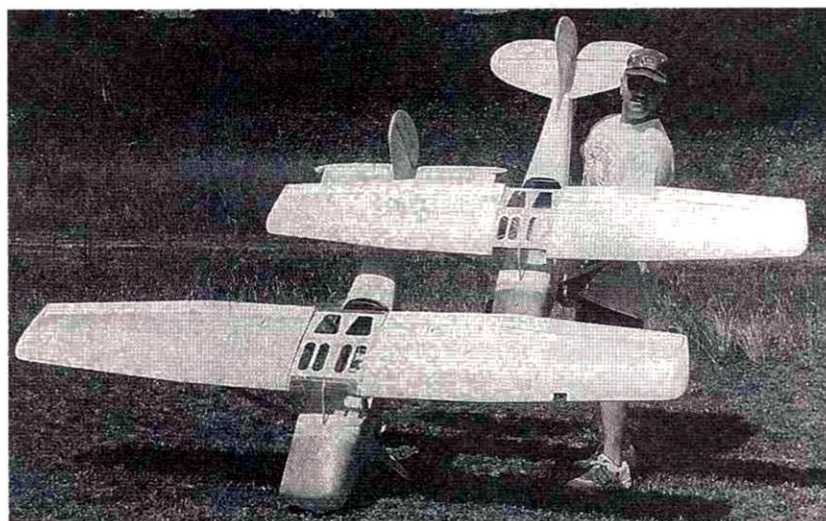
In keeping with my last column, where I suggested that civilian aircraft are good scale subjects, I'd like to mention a couple of airplanes

CESSNA WARBIRD

An airplane that can stand proudly on the line between civilian and military aircraft is the Cessna L-19, also known as the OE-1 Bird Dog. Roy Vaillancourt of Vailly Aviation* just sent me a press release for his Bird Dog plans. Roy offers the L-19 plans in a 1/5-scale (88.6-inch span) and a 1/4-scale (108-inch span) version and has formed landing gear and fiberglass cowls available for both. Primary construction for both versions is tried-and-true balsa and plywood, and the plans include details for flaps. If you're looking for an easy to document, fun to fly warbird (that's not cloth covered) then Roy's L-19 in either size may be your answer.

WIRE WING ATTACHMENTS

My Fleet Bipe was seriously damaged in early 1997 as a result of a flood in my basement workshop. After removing the covering and checking the glue joints, replacing radio equipment, etc., my refinished model seemed better



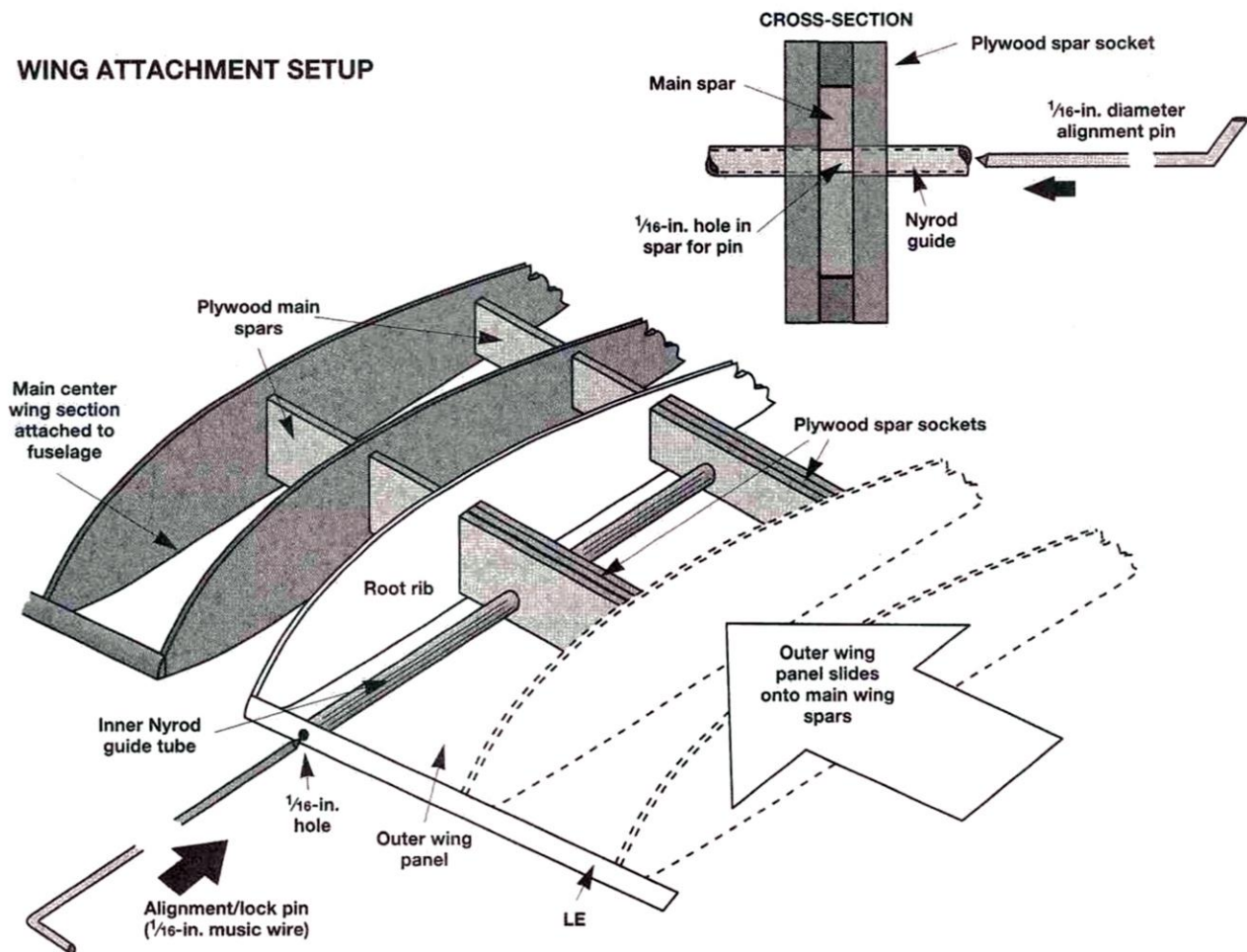
That's Roy Vaillancourt of Vailly Aviation showing off his two Cessna L-19 Bird Dogs. Available in 1/4-scale and 1/5-scale, Roy's L-19s stand on the line between civilian and military aircraft.

than ever. The wing attachments did, however, concern me, so I modified them by replacing the wing bolts in the main spars with slide-in wires.

I cut the covering off the first rib bay at the root end of the wing panel and

then slid the wing panel onto the main center wing section spar, carefully checking the wing's alignment to the fuselage. I then used a long 1/16-inch diameter drill bit from Harry Higley* and drilled a hole through the LE and

WING ATTACHMENT SETUP



into the spars and spar sockets. I removed the wing panel, enlarged the holes to $\frac{3}{32}$ inch and installed a length of inner Nyrod pushrod material to act as a guide for the $\frac{1}{16}$ -inch attachment wire. The guide leads from the aft edge of the LE into the faces of the spar sockets. This allows the wing spars to slide in and out of the sockets when the attachment wire is removed.

The result of this arrangement is a quick wing attachment that gives an accurate alignment of the wing panels. The friction of the $\frac{1}{16}$ -inch wire in the guide prevents the wire from coming out while in flight. A small piece of tape secures the small 90-degree bend at the LE for added protection.

JET STUFF

I own a Jet Model Products* T-33, and I must tell you how impressed I am with this kit. Owner Tom Cook, began the T-33 project about seven years ago with the idea of providing a model that is big enough to be seen, looks like the real thing, flies like the real thing and can be built inside of two months, not two years! In my opinion, he has succeeded.



Seven years in the making, the JMP T-33 ducted fan jet is a wonderful kit. Eighty percent of the airframe is already built for you when you open the box.

This 85-inch span, 76 $\frac{1}{2}$ -inch long, IMAA-legal ducted-fan jet has been flown quite successfully at the Top Gun scale invitational by Jeff Foley, using a Dynamax fan and an O.S. .91 for power. (A turbine version is also available.) The model weighs about 20 pounds ready to fly. Much of the success in keeping such a large airframe light is in its modular design and the fact that 80 percent of the plane is

Bob Violett Models carries an extensive line of pneumatic cylinders and air accessories specially designed for the scale modeler. Opening and closing speed brakes or powering wheel well doors are typical scale functions these air cylinders are designed for.

factory built. The complete central fuse/wing root assembly is laid up in a single piece. Add the nose and tail sections and plug in the wing panels (wingtip tanks are molded into the panels), and you have a complete airframe. Built this way, the JMP T-33 is a giant

scale jet that's easily transportable.

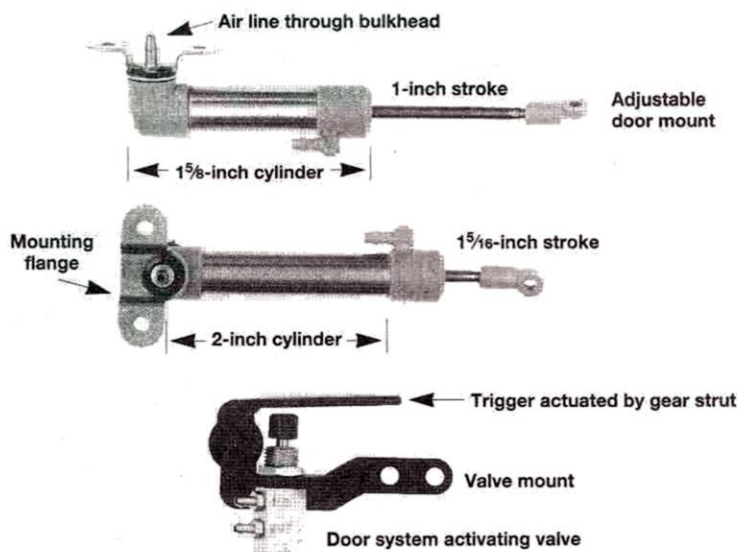
A large amount of carbon fiber is carefully added to the structures of the model to increase strength while minimizing weight. Panel lines are molded in, and the model even comes pre-primed. Tom also has specially made shock-absorbing scale retracts for the T-33 that come with the tires already installed, as an option. All this quality and design are not inexpensive,

but the T-33 is well worth the expense, considering all the value you get. Give Tom a call and ask about his T-33.

BVM CYLINDERS

Higher-level scale competition is certainly becoming more and more difficult these days, and the proverbial "stakes" seem to be raised at every event. The functioning wheel-well door, speed brakes, retractable tail-wheel, etc., are now considered the norm and not just special mechanical options. If you have access to a machine shop, you could make your own pneumatic drive units to drive these scale features, but if not, where would you get them? Bob Violett Models* has air-powered cylinders that include a pivot point and mounting flange built right into the body of the actuating cylinder. These units are perfect for actuating scale options, as they are also available with an Air Micro Switch (actuating valve) and a trigger mount. The trigger can be actuated by a landing-gear strut or other moving parts of your aircraft. BVM has many products to complement your pneumatic system. From door attachments to 4- and 5-way air junction boxes, I think these BVM devices are the type of scale items that can easily find their way into your next project.

*Addresses are listed alphabetically in the Index of Manufacturers on page 126.





Golden **AGE** OF R/C

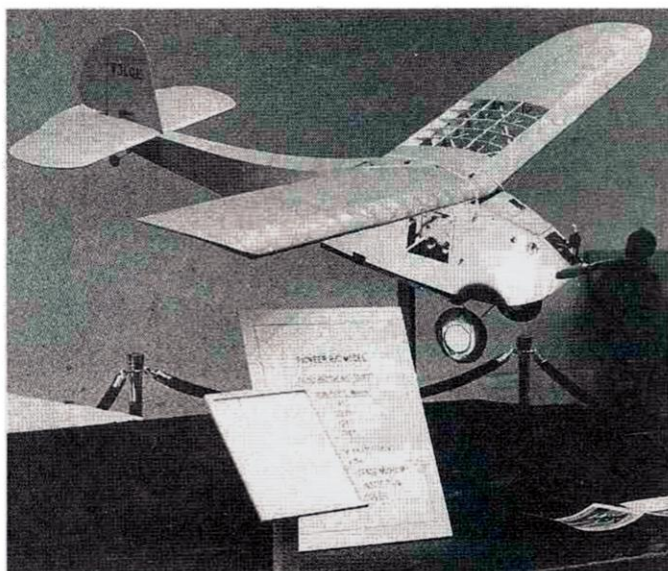
by HAL deBOLT

THE "GOOD" OLE DAYS

This month, we continue to review the advent of R/C from 1934 to 1937. I'm sure you were astounded by the great effort of Clinton DeSoto to show that R/C was possible in those very early days. Anyone who has ever tried to develop something completely new can appreciate his mind-boggling endeavors.

Now it's time to write about two other true R/C pioneers: Drs. Walter and William Good (perhaps better known as the "Good Brothers"). Natives of Kalamazoo, MI, they were enticed into modeling during the glory days of aviation. Because rubber was the only power available, we all got our start with that. The Goods probably latched onto gas models when they first arrived on the scene. At that point, Bill acquired an inter-

Unlike most early R/Cs, Big Guff survived the years and is now in the Smithsonian Institution as an example of very early R/C.



est in electronics (radios and such were just emerging); Walt's interest stayed with modeling.

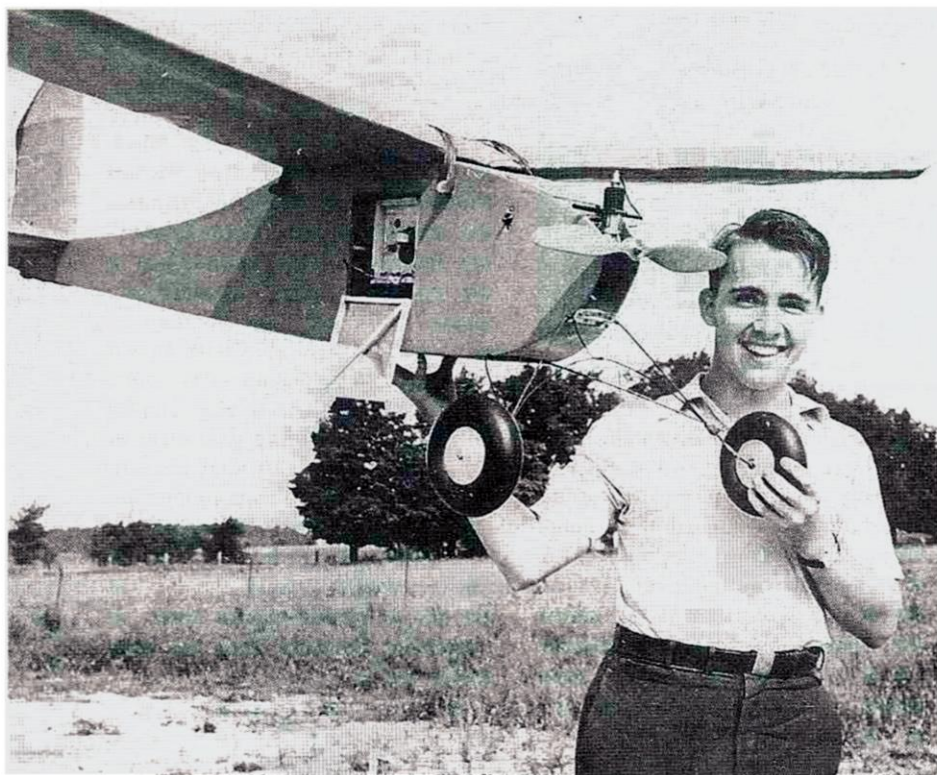
Free-flight gas competition was paramount in the early '30s. Walt became deeply involved and made a mark for himself with his Guff free-flight design. If my memory serves, like most of us in those days, Walt based his design on the theories of Charles Grant, editor of *Model*

Airplane News. His book, "Model Aircraft Design and Theory of Flight," was our bible! The shape and characteristics of Walt's Guff reflected Grant's parameters to a T. Good stuff!

While Bill was studying electronics, he saw the possibility of R/C for models. Inspired, it wasn't difficult to convince brother Walt that they should give R/C a try. Bill would develop the radio and Walt the aircraft. When entering any new territory, a smart designer leans on past experience. Any aircraft that used an early R/C system had to be extremely stable. Walt simply enlarged his successful Guff—weight was the major factor—and thus Big Guff came alive. Brother Bill burned lots of midnight oil tinkering with the radio. He realized that transmitter power could alleviate receiver needs and that airborne weight was a serious consideration. The Goods used a 110V generator to power the transmitter.

The Good brothers spent much time developing the radio and Big Guff until repeated success was attained. Then they took their effort to the first R/C Nats in Detroit. With few entries, only one day was allotted to the R/C event. The weather in the morning was flyable, but no 110V outlet was available at the flying site. It took half a day to make arrangements to operate from a remote 110V source. By then, the weather had deteriorated and it

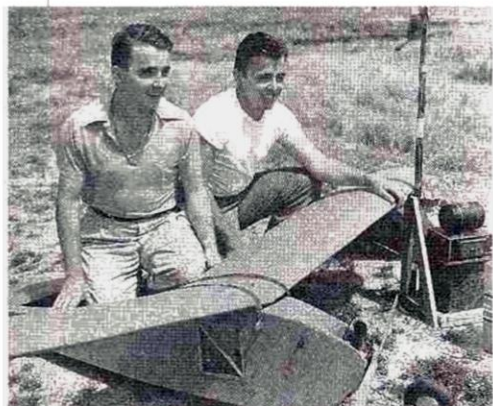
Walt holds Big Guff. Note the open door that shows the removable R/C unit. It's a wonder that the Brown Jrs. flew these big and heavy R/Cs!



wasn't possible to fly anymore. All the effort had been in vain! But that did not end the Big Guff saga; the Guff would prove to be outstanding in future Nats, winning several times and making its presence felt until 1947—a 10-year span!

It seems appropriate to end with a synopsis of the Good brothers' lives beyond modeling. Bill developed a serious interest in electronics and found a "home" with General Electric in Syracuse, NY. I believe he's still there. Walt earned a doctorate in physics, and this took him and his lovely wife Joyce to Johns Hopkins University in Bethesda, MD. His efforts at Johns Hopkins were exemplary: a highlight was his part in developing the proximity fuse during WW II. He became head of the Physics Department and retired about 20 years ago to New Port Richey, FL, where he and Joyce enjoy life.

Walt's involvement with the AMA would easily fill a book. Over the years, he has served on various com-



The very early R/C pioneers, Walt and Bill Good, with their famous Big Guff. Note the transmitter with its generator power.

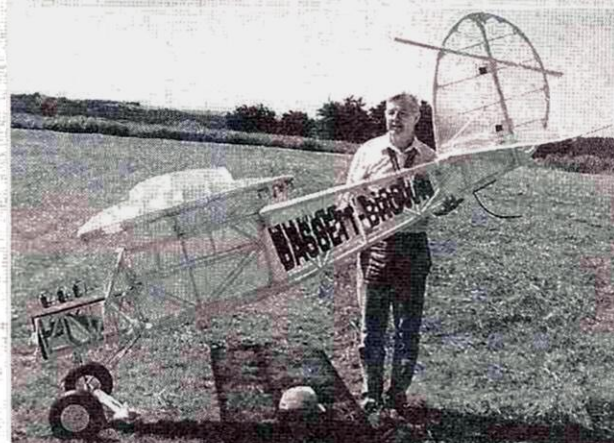
mittees, often as chairman. His efforts solved many growing pains for the AMA, and he served several terms as AMA president. The AMA honored Walt Good in every possible way, including a fellowship and entry into the Hall of Fame. In retirement, Walt is still active on the AMA frequency committee and enjoys flying with the Pasco County Soaring Group.

The Big Guff did not end the Goods' early R/C activity; it just led to more and better. Next month, there will be more "Good stuff" for you to contemplate! ✦

WHAT ARE OT R/C'ERS DOING NOW?

I asked you for input, and the first came from Jerry Smartt of Warsaw, MO. Jerry may not have been a nationally known modeler, but he is stalwart in his locality. That's just fine! [Editor's note: Jerry is very well-known in the electric flight community.]

Now retired to the Ozark Mountains from—for him—hectic California, Jerry supported his hobbies as an English professor. (He chose that profession for



Spectators at the Bassett-Brown commemorative meet were astounded by Jerry Smartt's gigantic, 15-foot-span version of Bassett's "Miss Philly."

the spare hobby time it provided!) In his second hobby, cross-country running, Jerry was nationally ranked, and he was America's fastest at 10,000 meters. He was also a member of five international teams, was on the USA 1956 Olympic team and also USA versus Russia in 1958. Much competition was overseas, and he did it all well!

Scats Rogers and his aircraft enticed Jerry into modeling at age six. Rogers was Jerry's hero! Jerry progressed with free flight until '55 when all his spare time went into athletic training and competitions. He ran out of steam in '79 and put models back on the front burner. His first R/C was a Goldberg Senior Falcon, but he really caught on with a Gentle Lady sailplane. Jerry became the AMA Nats electric power champion in '91 and '94. He's now very active in the Society of Antique Modeling events, but he concentrates on giant electrics. In contrast, he's interested in the Spirit of SAM event, which has a maximum model weight of 10 ounces! Jerry is now developing the use of multiple receivers in large models; he uses four in his 14½-foot sailplane.

Are you aware of the Bassett-Brown commemorative event that was held in Pennsylvania this past summer? Jerry astounded all with his 15-foot-span, 4,800-square-inch version of Bassett's first gas model, Miss Philly. Three authentic-looking (but fake) Brown Jr. engines dress it up, and actual power comes from five electric motors geared to one shaft driving a 22-inch prop. Dave Chinnery of England produced the 1¾hp combo! Wheels are go-kart inner tubes—talk about being way out!

There seems no end to this OT'er's exploits. Jerry is now tuning an electric-powered version of Heller's 1941 rubber design for the '97 SAM champs. He gets a 30-minute motor run on 4 ounces of batteries!

Great modeler? Perhaps your bio is not fantastic—no problem, we still would like to read it! Remember, this is your OT R/C place!



Another of Smartt's exploits—his electric-powered version of Homer Heller's 1941 rubber design. It runs for 30 minutes and was Jerry's 1997 SAM Championships entry.

LATEST PRODUCT RELEASES

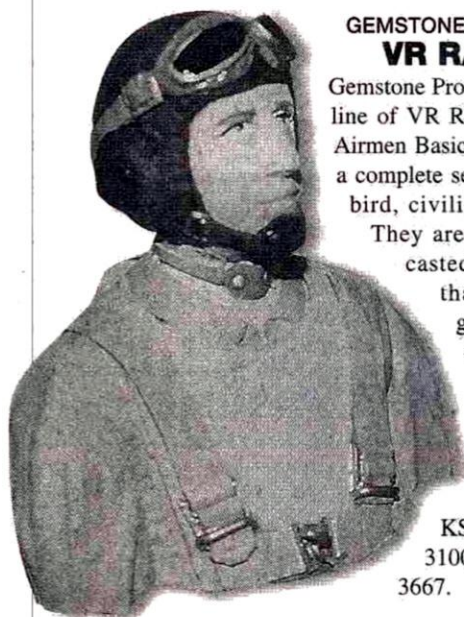


AIRDROME

Douglas A-26B Invader

Airdrome offers plans for a 7/8-inch-scale, electric, hand-launched version of this WW II aircraft. Plans also show details for scale, plug-in landing gear. Specifications: span—61.25 inches; wing area—552 square inches; vacuum-formed cowls, canopies, gun turrets, etc., for Airdrome plans are available from EPP Inc. at (800) 304-3774. Machine-cut wooden parts are available from Airdrome. Price—\$48 (plans) plus \$4 if rolled; \$14 (plus \$3.50 S&H) (documentation).

Airdrome, P.O. Box 1425, FDR Sta., New York, NY 10150; (212) 421-1440.



GEMSTONE PRODUCTS INC. VR R/C Pilots

Gemstone Products Inc. has a new line of VR R/C Pilots called the Airmen Basic Series that features a complete set of unpainted war-bird, civilian and jet figures.

They are lightweight, spin-casted, urethane figures that come with diagrams and a paint chart.

Price—\$15 to \$20.

Gemstone
Products Inc.,
1819 S.
Broadway, Salina,
KS 67401; (815) 485-
3100; fax (800) 973-
3667.

MICROBRUSH CORP.

Bendable Applicators

Made of small, non-linting, non-absorbent fibers, these brushes can apply extremely small amounts of adhesives, solvents and paints without dripping, spilling, or staining. The brushes also can be bent to reach out-of-the-way places on your model.

Microbrush Corp., 1376 Cheyenne Ave., Grafton, WI 53024; (414) 375-4011; fax (414) 375-2777; website <http://www.microbrush.com>.

PROPWASH VIDEO
PRODUCTIONS

Top Gun 1997

See 64 modeling masterpieces, such as Terry Nitsch's turbine-powered F-80, Randy Hansen's AgWagon and Ramon Torres' Beech T-42A during this 114-minute video. Frank Tiano, "Mr. Top Gun," narrates the video, which includes halftime demonstrations, crashes and awards coverage. The video also features interviews with the pilots and builders.

Price—\$24.95 plus \$3.25 S&H.

Propwash Video Productions, 2973 Berman St., Las Vegas, NV 89109; (702) 731-5217.

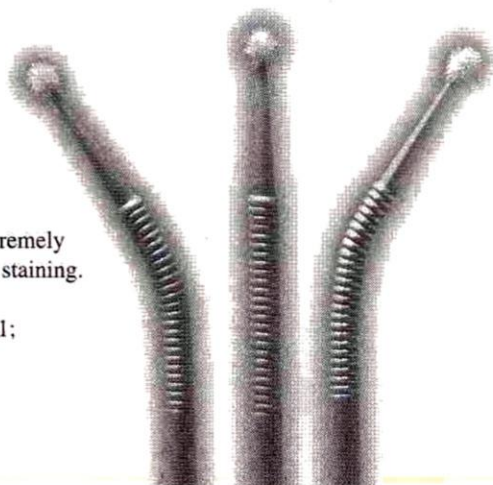


VA MINIATURE REPLICAS Mills 0.75cc (1948) Replica Engines

Suitable for small R/C use, the Mills 0.015ci and 0.024ci diesel engines are equipped with a Mills-type throttle; a separate venturi with a tank and needle valve is also available.

Prices—\$105 (0.015ci), \$101 (0.024ci), plus \$3 S&H.

VA Miniatures; available from Richard Palmer, P.O. Box 609, Palisades, NY 10964; phone/fax (914) 359-9240.





HOUSE OF BALSA **Bonanza**

This 1/12 stand-off-scale kit features all balsa and ply construction, full-size rolled plans and formed plastic fuselage top and canopy. It also comes with photo-illustrated instructions and scale documentation. The Bonanza requires two to four channels for control.
Price—\$49.95.

House of Balsa, 10101 Yucca Rd., Adelanto, CA 92301; (760) 246-6462; fax (760) 246-8769.

CUTTING EDGE ENTERPRISES **PowerPorts**

These portable, compact (4.25x4.5x6-inch) power supply packs weigh only 9 pounds and can be charged by your car's cigarette lighter or by using the included automatic wall charger. Each

comes with one DC and two AC outlets.

Prices—\$179.95

(PowerPort 259, 250W, 9A), \$159.95 (PowerPort 149 140W, 9A), \$119.95

(PowerPort 50, 50, 7A), plus S&H.

Cutting Edge Enterprises, 1803 Mission St., Ste. #546, Santa Cruz, CA 95060; (800) 206-0115.



DYMOND MODELSPORT USA LTD.

DC/DC Delta Peak Booster Charger

Charge from 10 to 12 Ni-Cd cells using a car battery in 15 to 20 minutes with this tool. The charging current can be adjusted from 0.5 to 4.2 amps, and LEDs indicate proper power hookup, trickle-charge and fast-charge modes. A glow-plug-shaped adapter allows direct charging of pocket boosters, and a safety feature prevents short circuits and reverse polarity.

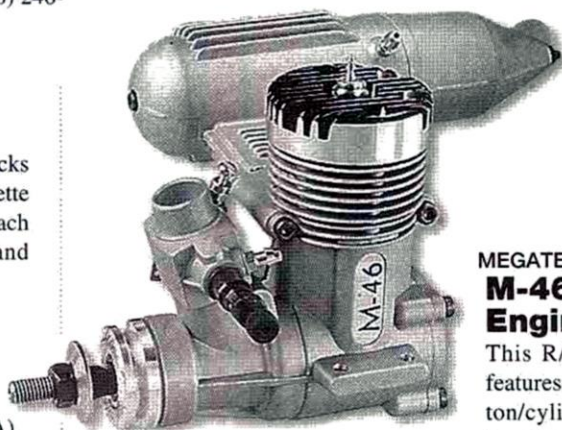
Part no.—20250; price—\$79.95.

Dymond Modelsport USA Ltd., 500 Court St., Park Falls, WI 54552; (715) 762-2710; fax (715) 762-2542.

AMR PRODUCTIONS **"Warbirds 97"**

This 2-hour video features fighters, bombers and other military airplanes from this event, including a demo flight of a JPX turbine in a BVM Bandit, Dave West's P-47 Daddy Rabbit and a giant Tigercat. Be a part of the action as you watch these scale models take to the skies and go behind the scenes with in-depth interviews of the pilots and builders. "Birds of Prey 97" and "Thunder in the Skies 97" videos are also available.
Price—\$19.95.

AMR Productions, P.O. Box 1813, Toms River, NJ 08754; (609) 971-8338.



MEGATECH **M-46 ABC Engine**

This R/C engine features ABC piston/cylinder construction; a twin-

needle carburetor with a mechanical idle-stop adjustment and non-sensitive needle valve; dual ball bearings; and an efficient muffler. It comes with a 2-year factory warranty and will turn a 10x7 propeller at 13,500rpm.

Part no.—MTC4600; price—\$79.95.

Megatech; distributed by America's Hobby Center, P.O. Box 32, North Bergen NJ 07047; (201) 662-8500; fax (201) 662-1450; website <http://www.megatechrc.com/>.



Descriptions of products appearing in these pages were derived from press releases supplied by their manufacturers and/or their advertising agencies. The information given here does not constitute endorsement by Model Airplane News, nor does it guarantee product performance. When writing to the manufacturer about any product described here, be sure to mention that you read about it in Model Airplane News. Manufacturers! To have your products featured here, address the press releases to Model Airplane News, attention: Product News, Air Age Inc., 100 East Ridge, Ridgefield, CT 06877-4606.

CLASSIFIEDS

BUSINESS

SCALE AIRCRAFT DOCUMENTATION and resource guide. Larger, updated 1998 edition. World's largest commercial collection. Over 7,000 different color Foto-Paaks and 35,000 3-view line drawings. 218-page resource guide/catalogue—\$8; Canada—\$10; foreign—\$15. Bob Banks's Scale Model Research, 3114 Yukon Ave., Costa Mesa, CA 92626; (714) 979-8058. [3/98]

GIANT-SCALE PLANS BY HOSTETLER. Send SASE to Wendell Hostetler's Plans, 1041 Heatherwood B, Orrville, OH 44667. Phone (330) 682-8896; fax (330) 682-5357; <http://www.aero-sports.com/whplans>. [6/98]

SODA-CAN AIRPLANES—replica biplane detail plans with photos, \$7.50 PPD. Early's Craft, 15069 Valley Blvd. SP 26, Fontana, CA 92335. [8/98]

REPLICA SWISS WATCHES—18KT gold-plated! Lowest prices! Two-year warranty! Waterproof divers, chronographs, others! Phone (770) 682-0609; fax (770) 682-1710.

GEE BEE PLANS used for full-scale R-2, "Z" Ten airplanes, 1/3-1/24. Catalogue/News \$4. Vern Clements, 308 Palo Alto, Caldwell, ID 83605; (208) 459-7608. [3/98]

LARGE-SCALE SAILPLANES AND TOWPLANES—new and used—call (212) 879-1634. Sailplanes Unlimited, 63 East 82nd St., New York, NY 10028. www.sailplanes.com. [5/98]

R/C SKYDIVING: Thrilling free-falls, chute opens by transmitter. Parafall Parachute duplicates all canopy maneuvers, turns, stalls, spirals, landing flares, etc. Latest catalogue \$1. R/C Skydivers, Box 662M, St. Croix Falls, WI 54024. [3/98]

PLANS—R/C sailplanes, scale, sport and electric. Old-timer nostalgia and FF scale and sport-powered, rubber and towline. All models illustrated. Catalogue \$2. Cirrus Aviation, P.O. Box 7093, Depot 4, Victoria, BC V9B 4Z2 Canada. [3/98]

MAKE REAL DECALS with your computer and printer. Send \$10 for introductory kit to LABCO, Dept. MAN, 27563 Dover, Warren, MI 48093. <http://www.mich.com/labco/>. [3/98]

LANDING GEAR PLANS: Build functional, spring-loaded gear for any size model. Send \$7.50 shipping and handling to Jesse Lyon, 22 Metro Trail, Hopalong, NJ 07843. You will never use conventional gear again! [3/98]

RATES: non-commercial—25 cents per word (no commercial ads of any kind accepted at this rate); commercial—50 cents per word (applies to retailers, manufacturers, etc.); count all initials, numbers, name and address, city, state, zip code and phone number. All ads must be paid for in advance. To run your ad for more than one month, multiply your payment by the number of months you want it to run. Deadline: the 10th day of the month, 3 months in advance, e.g., January 10 for the April issue. We don't furnish box numbers, and it isn't our policy to send tear sheets. Please make all checks and money orders in U.S. funds, payable to: AIR AGE, INC. SEND AD AND PAYMENT TO: CLASSIFIED ADS, Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606 or call (203) 431-9000.

NEW ZEALAND AERO PRODUCTS. Scale plans: Agwagon, Airtruk/Skyfarmer, Pawnee, Pawnee Brave, Fletcher FU-24, DC-3/C-47, Cessna 152 Aerobat, Hall's Springfield Bulldog, Fairchild PT-19, Fleet PT-26, Rearwin Sportster, Typhoon and more. Hardware packs, color photo packs available. Free documentation with plans. Catalogue/price list: \$5 (U.S.); Visa/MC. 34 Ward Parade, Stirling Point, Bluff, New Zealand. Phone/24 hr. fax: 643-2128192. [3/98]

FLYRITE BUILDING SERVICE. Experience in fine detail and craftsmanship of any kit. Top Flite, Great Planes, Midwest, Goldberg, Sig, etc. From box to air. (513) 755-8894. [2/98]

HELICOPTER SCHOOL: Five days of hands-on instruction with X-Cell helicopter and Futaba and JR Radios. Small classes, tailored to meet your individual needs, beginning to experts. Includes all meals and lodging. Over 520 satisfied students from 23 countries and 44 states, logging 20,000 flights in the last seven years. Located on a 67-acre airport used exclusively for R/C training. Owned and operated by Ernie Huber, five-time national helicopter champion and designer. Send for free information and class schedule NOW! R/C Flight Training Center, P.O. Box 727, Crescent City, FL 32112; (800) 452-1667; fax (904) 698-4724. Outside of U.S., (904) 698-4275. www.RCHELICOPTER.COM. [2/98]

MAKE YOUR OWN ROCKET MOTORS!!! Homemade solid and composite fuels power R/C gliders, model rockets, etc. Smoke tracers for R/C planes & choppers, electric igniters, cannon fuse "chemicals," lab acids, glassware, "How-to" Books, videos, rocket motor kits, "huge" catalogue \$2. Pyrotek, P.O. Box 300, Sweet Valley, PA 18656; (717) 256-3087. [8/98]

HELICOPTERS-BOLAR HELI RESEARCH: We build your heli, test your heli, repair your heli. Complete construction with new or your equipment. Also, the best prices on helicopter kits, radio systems (Airtronics, Futaba, JR), engines and exhaust systems. Bolar Heli Research, 322 N. 7th St., Lehighton, PA 18235; (610) 377-4941; email bolar@mail.ptdprolog.net. [3/98]

C/TEC BUILDING SERVICE. Proctor, Sig, Balsa USA, Goldberg, etc. Build to any stage of construction. Quality is our most important product. Redmond, OR; (541) 504-4638. [4/98]

FIGHTER WIND VANE PLANS. Details. Large SASE. Airmodel, Box 72, Ocala, FL 34478-0072. [3/98]

BUILDING SERVICE. Kits to scratch. Large-scale specialists. (513) 528-7221. [1/98]

OBECHI VENEER, premium-grade sheets, 1/32" x 12" x 110" long—\$7 U.S. & S&H, more sizes available. We manufacture 15 glider kits ranging from hand-launch to 5-meter scale. Hitec dealer. 10-meter rolls of Ultracote. Send \$0.60 in postage for our photo-illustrated catalog to Dream Catcher Hobby Inc., P.O. Box 77, Bristol, IN 46507, or see our Web page at <http://www.dchobby.com>. To order, call (219) 848-1427; we accept Visa/Mastercard. [4/98]

BUSINESS FOR SALE: established hobby shop, Western Colorado. Mild climate. Contact Charles, (970) 245-5504. [5/98]

PRECISION CUT KITS ... Fastest growing kit-cutter in the industry. We cut from anyone's plans and have experience with designers from the one-of-a-kind to the mass-produced. Our reputation for unsurpassed quality and on-time delivery has propelled us to the forefront of this industry. Every piece is hand cut on state-of-the-art equipment, and only the finest balsa and plywood is used. Many popular kits available for immediate shipment. Phone, fax or write for free information packet. Free quotes; Visa/Mastercard accepted. CODs. International orders welcome. PRECISION CUT ... our name, our ethic. Larry Katona, Pres., 63 Carlton Ave., Ewing, NJ 08618; (609) 538-1388; fax (609) 883-0926. [2/98]

SUB MINIATURE PRESSURE GAUGES FOR SALE. A perfect pressure monitor for any R/C gear retract system. \$35 PPD. Sal Mangano, (203) 426-3496, 9-5 EST; email 73147.1725@compuserve.com. [2/97]

SCALE MODEL RESEARCH—aircraft, warships, armor. We have books and plans from all over the world. Catalog: \$3. Research in Scale, 205 Maryland Ave., Paterson, NJ 07503. [2/98]

AERO FX BY JO DESIGNS. Exact-scale, computer-cut, high-performance vinyl graphics and paint masks. Lettering; nose art; insignia for scale, pattern, pylon and sport flyers; complete graphic sets available. Call or write for free sample and catalogue. JO Designs, Rt. 1, Box 225AA, Stratford, OK 74782; (405) 759-3333; fax (405) 759-3340. [6/98]

DESIGNER: Estes Industries and Cox, leading manufacturers in the toy and hobby industry, are looking for a designer to work in our manufacturing facility in Colorado. We have an excellent opportunity for a hands-on designer who can "make things fly." Candidates must have a good understanding of aeronautics and a familiarity with model airplanes, either as a hobby or professionally. AutoCAD, experience, and engineering background, and knowledge of injection-molded plastics are definite pluses. We offer an excellent starting salary and benefits packages. Mail resume to Personnel Department, Estes Industries/Cox, P.O. Box 227, Penrose, CO 81240, or fax to (719) 372-3217. [2/98]

CASH FOR ENGINES: ignition, glow, diesel, all types; any condition; sale list, too! Estates my specialty! Send SASE for list. Bob Boumstein, 10970 Marcy Plaza, Omaha, NE 68154; (402) 334-0122. [3/98]

BUILD A BIKECAR: <http://www.bikecar.com>. [6/98]

STRING TRIMMER CONVERSIONS. We convert small engines for model aircraft, boats, etc. Machined-part kits are available for Homelite, Ryobi, Weedeater, McCulloch, etc. 4-cycle Ryobi or Honda, or your prototype. Carr Precision, 6040 N. Cutter Cir., #303, Portland, OR 97217; (503) 735-9980; fax (503) 285-0553; email carrprecision@worldnet.att.net. [6/98]

ANTIQUITY IGNITION-GLOW PARTS CATALOG. timers, needle valves, cylinder heads, pistons, tanks, spark plugs, racecar parts, rubber scale plans; engines: 1/2A, Baby Cyclones, McCoy's, Phantoms, etc. \$10 pp (U.S.); \$20 foreign. CHRIS ROSS-BACH, 135 Richwood Dr., Gloversville, NY 12708. [6/98]

DETHERMALIZING CERTAINTY. For most free-flight models. Weighs 0.7 to 1.2 grams. Large SASE to Wheels & Wings, P.O. Box 762, Lafayette, CA 94549-0762. [5/98]

ENGINES: IGNITION, GLOW, DIESEL. New, used, collectors, runners. Sell, trade, buy. Send \$5 for huge list to Rob Eierman, 504 Las Posas, Ridgecrest, CA 93555; (619) 375-5537. [6/98]

ALUMINUM CAN PLANS. Airplanes, Dragster, Ship. SASE for list. Tesscar, Box 333A, Scappoose, OR 97056, or members.aol.com/tesscar. [2/98]

AIRCRAFT WEATHERVANES: copper aircraft weathervanes for your home, yard, or hangar. BARNWORKS, Inc. Online catalogue <http://www.barnworks.com>. [4/98]

WW I GIANT-SCALE KITS! Fokker D-8, 111-in. span, Fokker D-7, 72-in. span, Junkers CL-1, 80-in. span. Send SASE to: JB Models, 22 Stone Church Rd., Rhinebeck, NY 12572; (914) 876-5354. [4/98]

PLANS-ENLARGING SOFTWARE-PLANS ENLARGING. Old magazines, scanning, plotting. Free information. Concept, Box 669A, Poyay, CA 92074; (619) 486-2464. [4/98]

FOR SALE: Up and running WW I plans service. Clark Smiley, 23 Riverbend, Newmarket, NH 03857. [2/98]

ENGINE REBUILDER. Crashed your plane? No problem! Most engines are rebuildable. Shaft, piston, flywheel problems, engine overhauls done. Send brief description of problem, \$50 deposit for parts to: J. Singleton, Eng., 1446 Broadway, Brooklyn, NY 11221. [2/98]

HOBBYIST

PAYING \$150 EACH FOR TOY OUTBOARD MOTORS: Mercury, LePage, Orkin, Oliver, Scott, Fuji, Sea-Fury Twin, Evinrude, Gale, Johnson, Gronowski, 140 N. Garfield Ave., Traverse City, MI 49686; (616) 941-2111. [2/98]

MAGAZINE BACK ISSUES—*American Modeler*, *American Aircraft Modeler*, *Aeromodeller*, *Model Airplane News*, *Model Aircraft*, *RCM* and more; 1930s-1990s. For list, send SASE to Carolyn Gierke, 1276 Ransom Rd., Lancaster, NY 14086. [3/98]

MODEL AIRPLANE NEWS, 1930-1980; "Air Trails," 1935-1952, "Young Men," 1952-1956; "American Modeler," 1957-1967; "American Aircraft Modeler," 1968-1975. \$1 for list. George Reith, 3597 Arbutus Dr. N., Cobble Hill, B.C., Canada V0R 1L1. [3/98]

WANTED: Old, unbuild, plastic model kits from '50s and '60s. Send list, price to Models, Box 863, Wyandette, MI 48192. [3/99]

WANTED: Futaba single stick helicopter radio. Complete system or transmitter only. (814) 825-8404. Bob Vomero. [2/98]

WANTED: model engines and racecars from before 1950. Don Blackburn, P.O. Box 15143, Amarillo, TX 79105; (806) 622-1657. [5/98]

WANTED: plans and instructions for "Ms. Martha." Will consider buying entire kit, if available. Call Mike, 10 a.m. to 6:30 p.m. EST, (607) 735-0410. [4/98]

USED ENGINES WANTED. Cash or trade. T. Crouss, 100 Smyrna, West Springfield, MA 01089. [2/98]

GIANT SALE: all must go, all reasonable offers accepted; have to move. Will ship anywhere. Small planes: e/2 Diablo w/O.S. 108-Pitts muffler w/Airtronics FM radio. Flies unreal; super airplane, \$550. Cloud Dancer w/O.S. 40 w/tuned pipe w/JR servos; wild flyer and fast, \$240. Scratchbuilt aggregation spray plane w/O.S. 40 FP w/Futaba radio, \$195. Kyosho AgWagon built, has been flown, n/radio n/motor \$125. Kyosho SR-X Heli w/O.S. SX .32 motor w/Airtronics computer, 660 radio w/all BB servos & gyro plus test stand. All new. Flies great. \$1,200. Sterling Lancer w/Webra 60 w/tuned pipe Airtronics servos, ready to fly, \$225. e/2 P-39 Air Cobra 40 w/retracts, new, never flown. Beautiful unit, \$300. e/2 PT-19 40, unreal detail and beautiful, never flown, \$250. F8F Bearcat .60 w/retracts w/working bombs and drop tank. Very sharp, never flown, n/motor n/radio, \$350. Hobbico 45 Spitfire w/retracts, ARF, new, never flown, \$200. e/2 P-51 Mustang, "Dallas Doll," 40 w/retracts. New, never flown, w/bombs and rockets, \$300. House of Balsa P-51 Mustang .25, ready to fly, n/motor n/radio, very sharp, \$75. Top Flite "Endicker" WW I w/K&B .40 w/Futaba radio, ready to fly, \$180. Right Flyer 25 w/O.S. FX 25 w/Airtronics FM radio. All new, ready to fly, \$325. Sig Wonder w/Enya 15 Futaba FM radio w/microservos, ready to fly, \$220. Balsa USA small Taube w/O.S. 60 4-stroke w/o radio, flies very nice, \$175. Right Flyer 40 w/O.S. 40 FP motor w/Airtronics radio. Ready to fly, all new, never flown, \$375. Sig 4-Star 40, very sharp, new, never flown, \$150. Hang glider w/Enya 19 w/Futaba AM radio. Ready to fly, \$125. Top Flite Corsair w/Robart retracts, "show quality," n/motor n/radio. Brand-new, never flown, \$550. Estes "Astro Blaster" rocket-powered glider, flies nice, \$50. Goldberg Eagle II trainer 40. New, never flown, n/motor, n/radio, \$125. Used motors: Supertigre 60. New style, near new, \$130. Kits new in the box: Hobbico Viper RTC, \$75. Skyward Sporty 40 ARF, \$145. Thunder Tiger Champion 45L, \$125. Small planes: EZ Super Decathlon with Magnum Pro 61, like new with Airtronics FM radio, unreal vertical and snaps, beautiful, \$400. Hi-G Turbo Tube Twin with Magnum 46 SE's. Airtronics FM radio, flaps, flies very fast. Lots of fun, new, \$550. Scratchbuilt Hots with Magnum .25 with Airtronics radio. Very light, \$265. Large-scale planes: Balsa USA 1/3-scale Pup, 9-ft. wingspan with Futaba servos. Flies great, looks great, \$850. Byron AT-6 deluxe kit complete NIB with Robart retracts and pneumatic kits, \$850 OBO. Lanier Stinger 120, 80-in. wingspan with ST 3000. Airtronics radio FM with BB servos, flies super, \$875. Cosmic Wind Racer 42% Horn Dog Racing, 96-in. wingspan, set up for 3-W Twin 4.2. No radio, very sharp and fast, \$1,800. Balsa USA 1/3-scale Stearman, show quality with smoke with 5.8 Sachs with Futaba servos, unreal detail, \$450. Balsa USA 1/3-scale Cub, 12-ft. wingspan with ST 4500 motor. Very pretty, flies great, \$2,800. Desert Aircraft DC-3 with O.S. FS .70 with Airtronics radio. Onboard glow, retracts, flaps, commercial airlines, complete, ready to fly. Show quality, \$6,800. Bradford 1/3-scale laser 200, 98-in. wingspan with new Brison 4.2, very sharp. Excellent flyer. All BB servos, Futaba \$2,200. Scratchbuilt P-51 Mustang with Robart retracts, 88-in. wingspan, set up for 3.2 gas, \$525. Balsa USA Big Taube, 83-in. wingspan with O.S. 90 4-stroke with Airtronics FM radio, show quality, flown twice, \$850. Bud Nosen 1/4-scale P-51. Kit is started, needs to be finished: make offer. Champion Powerhouse with O.S. 60 FSR motor, new JR Radio, 84-in. w/s, very nice flyer, looks great, \$295. Four Star 120-in., ready to fly, \$250. Jerry Juenemann, 383 Mopar Drive, Hays, KS 67601; (785) 628-6477. [2/98]



WING MFG

306 E. Simmons, Galesburg, IL 61401
Phone (309) 342-3009 • Fax (309) 342-3014

Sport-Scale SERIES

HIGH PERFORMANCE AIRCRAFT

AT-6 TEXAN "500"

KIT NO. 1030

Wing Mfg. has designed this legendary airplane into a multi-purpose sport scale model. As its big sister, the AT-6 makes a great R/C advanced trainer. Fly it with a .25 for fun or strap a .40 on it and go pylon racing.

Utilizing our box frame fuselage and foam core wing construction, the AT-6 builds fast and true. Rugged construction takes the punishment of rough field conditions and the AT-6's groovy flight characteristics give you the edge when you need it.

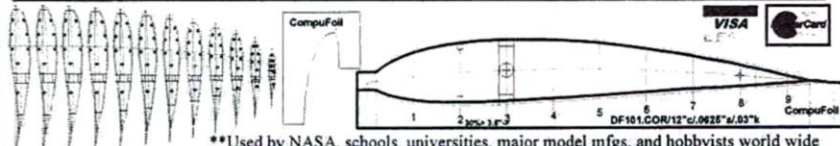
Kit includes: Plans, construction sheets, formed top fuselage, formed cowl, detailed clear canopy, formed fairings and misc. small parts, laser cut formers and bulkheads, precision cut foam core wings, full hardware pack, decal sheet with lots of numbers, and all necessary balsa to build the airframe. Optional Retractable Installation shown on plans.

SPECIFICATIONS:	
WING SPAN	55" (1396 mm)
WING AREA	500 SQ. IN.
FUSELAGE LENGTH	39" (994 mm)
DRY WEIGHT	5 LBS. (2270 G)
STABILIZER AREA	82 SQ. IN.
AIRFOIL	SEMI-SYMMETRICAL
ENGINE SIZE	.25 TO .50
RADIO	4 CHANNEL

CompuFoil Professional for Windows

The most popular airfoil plotting and modification program has just gotten better. Fully reprogrammed in optimized C++ for speed, with enhanced features, wrapped in a professionally developed Windows interface. Available options allow you to: create full sets of lofted ribs in either straight taper, elliptical, or modified elliptical planforms, complete with spar slots, jig holes, leading edges, sheeting, foam templates with wire kerf compensation, stations, ramps, airfoil transitions, etc., or leading edge shaping guides. Customize airfoils with a full host of modification functions, directly coordinate edits, or with the built in CAD utility while viewing overlays. Create DXF files and NACA 4, 5 and 6 digit airfoils with the click of a button as well as true print previews and automatic tiling of templates. Email to compufoil@aol.com or log onto the CompuFoil web page and download a the working demo version of CompuFoil as well as free utilities. <http://fourworld.com/serve.com/homepages/CompuFoil>

Starting at only \$35!! Purchase user upgradable features when you need them. Full Windows help file.



* Also available-Feather/Cut foam core machine. The perfect CompuFoil foam core partner, \$149.50

PROPWASH VIDEO PRODUCTIONS proudly presents 1997 TOURNAMENT OF CHAMPIONS

14th TOURNAMENT OF CHAMPIONS (1997)

- Two-tape Mega-volume
- Heavy Coverage of Free-style Routines
- Nonstop Airshow including performances by Wayne Handley
- Interviews & Awards Presentations
- Running Time - 3 hours-30 min.

\$24.95

PLEASE NOTE: Counts as two tapes for shipping charges.

TOP GUN TOURNAMENT 1997

- Our ninth year of covering this prestigious event
- Lots of static detail and flight footage
- In-depth interviews
- Complete awards coverage
- Narrated by Frank Tiano, Mr. Top Gun
- Running Time - approx. 110 minutes

\$24.95

TURBINE AMERICA (1997)
1997 JETS OVER DELAND
1997 SUPERMAN JET RALLY
1996 QSA LAS VEGAS FLY-IN
17TH SCALE MASTERS (1996)
\$19.95 EACH

1997 FLORIDA JETS
1996 TOP GUN TOURNAMENT
1997 HELI INTERNATIONAL
\$24.95 EACH

CONTACT US FOR YOUR FREE CATALOG

(702) 791-1466

(800) 355-7333 PROPWASH VIDEO PRODUCTIONS **(702) 791-1466**
(U.S. orders ONLY) 2973 Berman St., Dept. 01, Las Vegas, NV 89109
FAX (702) 735-1521 or E-Mail: proppwash@pipeline.com (Inquiries & Foreign orders)

ORDERING INFORMATION: Checks, money orders, Visa and MasterCard accepted. Discounts - 10% off if ordering more than one of the above programs. Shipping via AirMail, US, Canada & Mexico - \$3.25 per tape, \$1.50 ea. additional tape. Europe - \$5.00 ea. Airmail/Postage - \$5.00 ea. PAL, SECAM - add \$5.00 per tape & 24 hour phone number for orders.

Call now and stop struggling with plotting airfoils

Name **THAT PLANE**

CAN YOU IDENTIFY THIS AIRCRAFT?



Send your answer to *Model Airplane News*, **Name That Plane Contest** (state issue in which plane appeared), 100 East Ridge, Ridgefield, CT 06877-4606.

Congratulations to Eugene Umbright of St. Louis, MO, for correctly identifying the November '97 mystery plane, the Meyers 125. An all-metal, two-place light cabin monoplane, the Meyers 125 was designed and built by A.D. Meyers of Detroit, MI, in the late 1940s.



Reporters at an Annual Manufacturers' Demonstration air meet wrote, "The 125 is an exceptional, clean little aircraft, its interior well appointed in mohair and plastic. A Continental 125hp engine gives the ship a cruising speed of 120mph."

The winner will be drawn four weeks following publication from correct answers received (on a postcard delivered by U.S. Mail), and will receive a free one-year subscription to *Model Airplane News*. If already a subscriber, the winner will receive a free one-year extension of his subscription.

MODEL AIRPLANE NEWS **HOW TO**

HOW-TO ARTICLES WANTED

Do you have a construction technique, building method, or design innovation that you'd like to share with readers?

Why not publish your ideas in *Model Airplane News*?

For more information, contact assistant editor Debra Sharp
(203) 431-9000; e-mail: debs@airage.com



CVEC Power System™

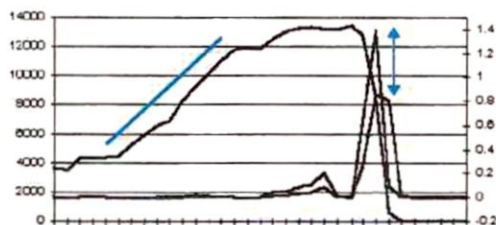
Universal systems now available for R/C planes, boats, cars...

Break the two-cycle performance barrier... less than 1/2 the size of a tuned pipe

Dynamometer tests on hobby scale engines prove its ability to:

- Decrease engine ramp-up time
- Provide more torque and horsepower
- Control noise emissions

**Satisfaction Guaranteed
or your money back**
Guarantee Subject to Conditions



<http://www.innoventive.com> • (800) 529-1919

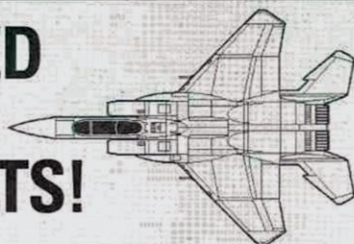
Innoventive Technologies, Inc • 16025 23 Mile Road • Macomb Twp, MI 48042

When You Want Zap Glue, But Your Hobby Shop Doesn't Stock It;

ZAP DIRECT
Full Product Line in Stock
The World's Greatest Adhesives

Everyday Discount **35%**
1-800-444-1995
VISA, MASTER, DISCOVER, & C.O.D.'s

**OUR CLASSIFIED
ADS GET
RESULTS!**



**FOR MORE
INFORMATION,
SEE PAGE 108.**

Introducing the
RC Video Show

by the
STICKMASTERS

A Review of Airplanes and Related Products,
Exciting Flying, Workshop, Building Tips,
Techniques & More...
Each Show Packed Full of Information

If you are even thinking of
building an RC Airplane!
Buy the Video Review First!
ORDER TODAY
1-800-951-7172

Introductory Price \$19.95
Plus \$3.50 S&H - NY Residents add 7% Tax
Each Show Features One of the Planes Listed:

Sig Spacewalker • Ohio Super Chipmunk
Midwest Super Stinker • Lanier I/3 Scale Lazer
Aerocraft Staudacker • Balsa USA Phaeton 90
Money saving coupons and chance to win a complete model kit included with each video purchase.

STICKMASTERS
RR1 Box 1179, Fort Ann, NY 12827
All Tapes VHS Format

INDEX OF MANUFACTURERS

Aeroglass, Box 185, Langton,
ON NOE 1G0, Canada; (519)
875-1533; fax (519) 875-1855.

Aerotech, 411 Beach Park Bld.,
Foster City, CA 94404;
(800) 573-9363; (650) 573-9363.

Airtronics, 15311 Barranca Pky.,
Irvine, CA 92718; (714) 727-1474;
fax (714) 727-1962.

Air-Kill Products, 14 Shady Lake
Court, Sacramento, CA 95834;
(916) 425-9933;

[http://fimt.net/~lms/Combat/
kitsplans/kits airkill.htm](http://fimt.net/~lms/Combat/kitsplans/kits airkill.htm)

APC Props; distributed by Landing
Products, P.O. Box 938, Knights
Landing, CA 95645; (916) 661-6515.

ASP; distributed by Hobby Lobby
(see address below)

Bob Violett Models (BVM),
170 State Rd. 419, Winter Springs,
FL 32708; (407) 327-6333;
fax (407) 466-3683.

Byron Originals, P.O. Box 279,
Ida Grove, IA 51445; (712)
364-3165; fax (712) 364-3901.

C.B. Tatone Inc., 21658 Cloud
Way, Hayward, CA 94545; (510)
783-4868; fax (510) 783-3283.

Collins Scientific, 7300 NW
Expressway, #171, Oklahoma City,
OK 73132; (405) 721-4502;

Concept Technology,
P.O. Box 669, Poway, CA 92074-
0669; (619) 486-2464.

**DAD (Design & Development
Corp.)**, 1412 317th Ave. NE,
Cambridge, MN 55008.

Davis Diesel Development,
P.O. Box 141, Milford, CT 06460;
(203) 877-1670.

Du-Bro Products,
P.O. Box 815, Wauconda, IL
60084; (800) 848-9411.

Dynalite, P.O. Box 1011,
San Marcos, CA 92069;
(760) 744-9605.

F&M Enterprises, 22522 Auburn
Dr., El Toro, CA 92630; (714) 583-
1455; fax (714) 583-1455.

Flitecraft, 1100 10th St., Box 66,
Baldwin, KS 66006; orders (800)
233-0545; fax (913) 549-2330.

Futaba Corp. of America,
P.O. Box 19767, Irvine, CA
92723-9767; (714) 455-9888;
fax (714) 455-9899.

Great Planes Model Distributors,
2904 Research Rd., P.O. Box
9021, Champaign, IL 61826-9021;
(217) 398-6300; fax (217) 398-
1104; website <http://www.hobbies.net/dynalite>.

Gus Morris Plans, 4709 Green
Meadows Ave., Torrance, CA
90505-5507; (310) 378-5679.

Hangar Nine; distributed by
Horizon Hobby Distributors, 4105
Fieldstone Rd., Champaign, IL
61821; (217) 355-9511.

Harry Higley & Sons, Inc.,
P.O. Box 532, Glenwood, IL 60425.

Hitec/RCD Inc., 10729
Wheatlands Ave., Ste. C, Santee,
CA 92071-2854; (619) 258-4940;
fax (619) 449-1002; website
<http://www.HITECRCD.COM/>.

Hobby Lobby Intl., 5614 Franklin
Pike Cir., Brentwood, TN 37027;
(615) 373-1444; fax (615) 377-
6948; email 74164.2423@
compuserve.com; website
<http://www.hobby-lobby.com>.

HobbyPox, 36 Pine St.,
Rockaway, NJ 07866; (201) 625-
3100; fax (201) 625-8303.

Horizon Hobby Distributors,
4105 Fieldstone Rd., Champaign,
IL 61821; (217) 355-9511.

House of Balsa, 10101 Yucca Rd.,
Adelanto, CA 92301; (760) 246
6462; fax (760) 246-8769;
[http://www.mag-web.com/
rc-modeler/hobnew/](http://www.mag-web.com/rc-modeler/hobnew/)

Jet Model Products, 211 N. Mullen
Rd., Belton, MO 64012; (816) 331-
0356; fax (816) 331-3930.

K&B Mfg. Inc., 2100 College Dr.,
Lake Havasu City, AZ 86403; (520)
453-3030; fax (520) 453-3559.

McDaniel R/C Inc., 1654 Crofton
Blvd., Ste. 4, Crofton, MD 21114;
(410) 721-6303; (301) 721-6306;
email: mcdaniel@mcdanielrc.com.

Midwest Products, P.O. Box 564,
Hobart, IN 46342-0564; (800)
348-3497; (219) 942-1134; fax
(219) 947-2347.

MonoKote; distributed by Great
Planes Model Distributors, P.O.
Box 9021, Champaign, IL 61826;
(217) 398-6300.

MVVS Corp. of America,
7 Switchbud Pl., #192-211, The
Woodlands, TX 77380; (281)
364-8011; fax (281) 298-7023.

O.S.; distributed by Great Planes
Model Distributors, P.O. Box 9021,
Champaign, IL 61826-9021; (217)
398-6300; fax (217) 398-1104.

Pacer Technology, 9420 Santa
Anita Ave., Rancho Cucamonga,
CA 91730 (909) 987-0550; (800)
538-3091.

PFM; distributed by Innovative
Products, P.O. Box 4365, Margate,
FL 33063.

Proctor Enterprises, 25450 N.E.
Eilers Rd., Aurora, OR 97002; (503)
678-1300; fax (503) 678-1342.

Quadra-Aerrow Inc.,
P.O. Box 183, 2040 Rogers Rd.,
Perth, Ontario, Canada K7H 3E3;
(613) 264-0010.

RJL Industries USA, P.O. Box 5,
Sierra Madre, CA 91025; (818)
359-0016; fax (818) 301-0298.

Saito; distributed by Horizon
Hobby Distributors, 4105
Fieldstone Rd., Champaign, IL
61821; (217) 355-9511.

Spring Air Products,
P.O. Box 37-3218, Satellite Beach,
FL 32937; (407) 728-9002;
fax (407) 728-2881.

Solartex; distributed by Global
Hobby Distributors, 10725 Ellis Ave.,
Fountain Valley, CA 92728; (714)
964-0827; fax (714) 962-6452.

SuperTigre; distributed by
Great Planes Model Distributors,
P.O. Box 9021, Champaign, IL
61826-9021; (217) 398-6300;
fax (217) 398-1104.

Top Flite; distributed by
Great Planes Model Distributors
(see address above).

Tru-Turn, P.O. Box 836,
South Houston, TX 77587; (713)
943-1867; fax (713) 943-7630.

U.S. Engines Products,
distributed by Great Planes.

Vailly Aviation, 18 Oakdale Ave.,
Farmingville, NY 11738;
After 6:30 pm EST (516) 732-4715.

Webra; distributed by Horizon
Hobby Distributors (see address
above).

Wildcat R/C Fuels, 3005 Park
Central, Unit T, Nicholasville, KY
40356; (606) 885-5619.

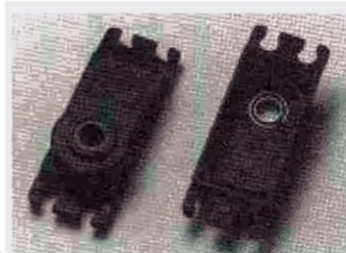
Zap-a-Dap-A-Goo, distributed by
Zap Glue

Zap Glue, 9420 Santa Anita Ave.,
Rancho Cucamonga, CA 91730.

Zenoah; distributed by ISC Intl.,
10620 N. College Ave., Indianapolis,
IN 46280; (317) 844-1978.

Zigg's Originals, 105 Swanton
Rd., Madison, WI 53714-1919;
(608) 249-4480; [http://fimt.net/~lms/
Combat/kitsplans/kits ziggs.htm](http://fimt.net/~lms/Combat/kitsplans/kits ziggs.htm).

LDM Industries Radio Accessories



B.B. Servo Conversion Kits

Our Ball Bearing Servo Conversion Kits will eliminate the slop and wobble that develops in your standard servos. These high quality kits can be installed in just minutes giving you all the benefits of ball bearing servos at a fraction of the cost. We have 3 different kits available that fit over 20 different standard size servos.

Kit #9600 Futaba 4-pack \$29.95
Kit #9610 Futaba Single \$7.95

Kit #9700 Airtronics 4-pack \$29.95
Kit #9710 Airtronics Single \$7.95

Kit #9800 JR-Hitec 4-pack \$20.95
Kit #9810 JR-Hitec Single \$5.95

Kit #9900 Futaba 3003 4-pack \$29.95
Kit #9910 Futaba 3003 Single \$7.95

Part #8000 The Strongbox \$7.95
Part #8100 The Strongbox II \$11.95



The Strongbox

The Strongbox and Strongbox II provide the ultimate in receiver and battery pack protection. These tough molded cases are lined with soft foam to protect your delicate electronics from vibration and crash damage. The Strongbox fits most .40 to 1.20 size models and the Strongbox II fits most 1/4 scale and larger size models.

To order, send a check or money order including \$4.00 for S&H to:

LDM Industries, Inc.
P.O. Box 292396
Tampa, FL 33687-2396
Phone (813) 991-4277
Fax (813) 991-4810

Florida residents add 6% sales tax.
VISA and MASTER CARD Accepted
© 1996 LDM Industries, Inc.

ADVERTISER INDEX

Ace Hobby Distributors.....94	JK Aerotech.....107
Aerospace Composites.....93	K&B Manufacturing.....110
Aerotech Models.....97	K&S Engineering.....103
Air Conquest.....35	Kerr Aircraft.....105
Air Magic.....96	Kress Jets.....107
Airdrome.....98	Kyosho.....10
Airtronics.....15	Landing Products.....105
Altech Marketing.....C2	Lanier RC.....23
America's Hobby Center.....124	Laster Hobbies.....99
Arizona Model Aircrafters.....95	LDM Industries.....128
Autogyro Company of Arizona.....94	Lite Machines.....35
Aveox Electric Flight.....110	Major Hobby.....61
Balsa USA.....73	MaxCim.....110
Bob Smith Industries.....9	McGrady Video Productions.....107
Brisson Aircraft.....105	Megatech.....125
Byron Originals.....5	Micro Fasteners.....103
C.B. Tatone.....96	Micro Mark.....71
Cabral Inc.....105	Midwest Products.....83
Cactus Aviation.....99	Miller R/C.....107
Capstone R/C Suppliers.....117	Model Electronics.....95
Cermak Model Supply.....81	Mud Duck Aviation.....110
Champion Model Products.....107	MVVS Corporation.....94
Chase-Dur.....4	Nelson Aircraft.....103
Clancy Aviation.....78	Nick Zirolli.....103
Cleveland Model.....110	Northwest Hobby Technologies.....103
Composite Structures Technology.....98	Norvel.....30-31
Computer Design.....110	Orr Products.....75
Coverite.....79	Pacific Aeromodeler.....128
Dare Hobby Distributors.....45	Paul K. Guillow.....75
Dave Brown Products.....91	Model Airplane News Pilots' Mart.....111-114
Desert Aircraft.....91	Precision Micro Electronics.....98
Don Smith R/C Aircraft Plans.....97	Propwash Video.....109
Du-Bro Products.....19,123	Redington Customs.....105
Dynafite.....119	Robart Manufacturing.....105,107
Electro Dynamics.....93	Roland Friestad.....96
Flight Line Toys.....110	Romco Manufacturing.....98
Flitecraft.....25	Sig Manufacturing.....41
FMA Direct.....52-53	SKS Video Productions.....103
Fox Manufacturing.....65	Slimline Manufacturing.....103
Frank Tiano Enterprises.....13,75	Smithy.....99
Futaba Industries.....C3	Soarsoft.....109
G and P Sales.....95	Spirit of Yesteryear.....107
Gerard Enterprises.....93	SR Batteries.....85
Global Hobbies.....3	Stickmasters.....126
Great Planes Manufacturing.....129	Studio B Graphic Design.....105
Hilyard Products.....96	Super Tigre.....48
Hitec/RCD.....21,127	Technopower II.....94
Hobby Lobby International.....51	Thunder Tiger.....7,115
Hobby Shack.....100-102	TNC Custom Electronics.....97
Horizon Hobby Distributors.....C4	Top Flite.....17
Innosol.....99	Tower Hobbies.....120-122
Innovative Model Products.....99	Trillium Balsa.....94
Innoventive Technologies.....118	Universal Laser.....96
J&K Products.....98	Vailly Aviation.....91
JD Model Products.....110	ViaGrafix Corporation.....116
	Vintage R/C Plans.....94
	Warehouse Hobbies.....126
	Windsor Propeller.....87
	Wing Manufacturing.....109
	WRAM Show.....77

F4U Corsair Sport Scale ARF

.40 Size WWII War Bird Made in USA

Updated kit Now even better scale appearance.

Radio: Requires 4 Ch (5 Servos)

Wing span: 55 in.

Wing Area: 530 sq. in.

Flying Wt: 5.3 lbs • Radio: 4 ch (5 Servos)

Engine: .40 - .46 (2C) or .48 - .70 (4C)

Price \$189.99 + \$5.99 (S&H)

Combo: w/Thunder Tiger Pro-46 Engine \$269.99

Painted One Piece Fiberglass cowl \$21.00

Fair Price on All Spare Parts

Pacific Aeromodel Mfg., Inc.

15437 Proctor Ave, City of Industry, CA 91745

• <http://www.pacaeromodel.com>

• E-mail: info@pacaeromodel.com



The round fuselage is made from one piece of thin plywood wrapped around plyformers. The 4-piece wings are tough balsa sheeted foam cores. All wood parts are pre-covered with a real heat-shrink polyester film (Oracover from Germany). Fuel tank, wheels, axles, landing gear, spinner, canopy, cowl decal & hardware package, even the aluminum prop nut are all included. Fast and easy assembly. Fully aerobatic, but stable enough for the novice pilot.

Please Send SASE for your Free Catalog

ORDERS ONLY 800-780-0100

Info: 626-961-6199 • FAX 626-330-9351



MODEL AIRPLANE NEWS (ISSN 0026-7295, USPS 533-470) is published monthly by Air Age Inc., 100 East Ridge, Ridgefield, CT 06877-4606. Copyright 1997; all rights reserved. The contents of this publication may not be reproduced in whole or in part without the consent of the copyright owner. Periodical postage permit paid at Ridgefield, CT, and additional mailing offices.

SUBSCRIPTIONS. Call (800) 827-0323 or set your Web browser to <http://www.airage.com/subscribe.html>. U.S.: \$39.95 for one year, \$59.95 for two years. Canada: \$56.66 for one year, \$91.97 for two years (Canadian prices include G.S.T.). Elsewhere: \$52.95 for one year, \$85.95 for two years. Canadian G.S.T. registration no. 13075 4872 RT.

EDITORIAL. Send correspondence to Editors, Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606. INTERNET: man@airage.com. We welcome all editorial submissions, but assume no responsibility for the loss of or damage to unsolicited material. To authors, photographers and people featured in this magazine: all materials published in Model Airplane News become the exclusive property of Air Age Inc., unless prior arrangement is made in writing with the Publisher.

ADVERTISING. Send advertising materials to Advertising Dept., Model Airplane News, 100 East Ridge, Ridgefield, CT 06877-4606; phone (203) 431-9000; fax (203) 431-3000.

CHANGE OF ADDRESS. To make sure you don't miss any issues, send your new address to Model Airplane News, P.O. Box 428, Mount Morris, IL 61054-9853, six weeks before you move. Please include the address label from a recent issue, or print the information exactly as shown on the label. The Post Office will not forward copies unless you provide extra postage.

POSTMASTER. Please send Form 3579 to Model Airplane News, P.O. Box 428, Mount Morris, IL 61054-9853.

Final APPROACH

50 YEARS LATER

In December of 1994, Paul Conrad and I discovered that we both harbored an ambition to build a rocket-powered X-1 and air drop it from a B-29 to commemorate the 50th anniversary of Chuck Yeager's famous "Sound Barrier" flight in 1947. We decided to forge ahead with a goal of flying the models in our club's annual Flying Circus. The problem was the huge disparity in size between the B-29—the biggest bomber of WW II—and the tiny X-1, which spanned less than 30 feet. We chose 1/12 scale as the largest

practical size for the Superfort, which would give us a rather small X-1, but my experience with small electric models indicated this should not be a problem.

I designed both aircraft using AutoCAD. To keep costs and weight down, both aircraft were built mostly from white foam and fiberglass. The B-29's fuse was cut using a hot-wire foam lathe (*Model Airplane News*, February 1997) and covered with carbon fiber and fiberglass. The wings and stab were foam with balsa skins, and the engine nacelles were molded using the "lost foam" process. For power, we chose four K&B*.61 engines, and the retracts were 1/5-scale Spring Air* units. We can't thank these two great companies enough for all the technical support they provided.

In the spring of 1997, with the 50th anniversary looming and time running out, Paul took over the partially built B-29 and made incredible progress. He joked about calling the plane "Ten to Midnight," because those are the hours he spent each and every night slaving away in the shop. It was Paul's idea to use balsa skins on the wings, and this turned out to be more practical than the vacuum-bagged glass skins I'd originally planned. As his work neared completion,

we realized the model would weigh less than 30 pounds, nearly 20 pounds lighter than any other 1/12-scale B-29 that we knew of.

Meanwhile, I rushed the X-1 to completion. The little rocket plane was just 31 inches long and featured a molded fiberglass fuselage. The wings were sheeted foam, and the tail surfaces were balsa. Of special interest were the tiny spring-loaded retracts, which duplicated the units on the original aircraft. The finished aircraft weighed just 24 ounces, and with an Aerotech* "E" rocket motor, performance promised to be impressive. As added insurance, I installed a Speed 400 electric motor in the nose. The rocket motor would be ignited by remote control, and we installed a safety lock-out to prevent ignition while still attached to the mothership.



The four K&B .61s power this 30-pound model nicely.



Paul worked a miracle, finishing the Superfort in time. Just one week before the Flying Circus, we met at an isolated flying field to conduct the maiden flight. After a hectic day of fixing countless last-minute problems, Paul taxied the giant out and took off in the gathering gloom. The flight was close to perfect, and the giant settled onto the runway to the sound of popping champagne corks.

Radio problems kept us from dropping the X-1 until the morning of the



It takes a team effort to mount the X-1 under the giant B-29.

air show. We installed the rocket plane in the cavernous bomb bay and prepped both aircraft for flight. The combination looked incredible sitting at the end of the runway with all four props turning. Paul advanced the throttles, and the Superfort accelerated down the runway and climbed into the morning sky. Needless to say, our pulses were racing as Paul made two lumbering circuits around the field. On the third pass over the runway, I counted down, and Paul toggled the release. The X-1 dropped free, but the enormous turbulence slammed the little plane back into the mothership, snapping off one wing. After so much work, watching its long

spiral to the trees was discouraging, to say the least.

This project is by no means ended. The B-29 flies beautifully, and building another X-1 is only a matter of time. The main lesson learned on the test flight was that the B-29 needs to be flying near stall speed to minimize turbulence. We may also add a "trapeze" as a way of getting the X-1 out of the dirty air next to its mothership. A project like this has a way of getting under your skin.

—Jim Ryan and Paul Conrad

*Addresses are listed alphabetically in the Index of Manufacturers on page 126. ✦



Jim Ryan holding the X-1.